



## **MS-9246 1U Rackmount Server**

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**English Version  
G52-S9246X1**

Manual Rev: 1.0

Release Date: July 2004



## **FCC-A Radio Frequency Interference Statement**

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This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

### **Notice 1**

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### **Notice 2**

Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

**VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RESEAU.**



*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:*

- (1) this device may not cause harmful interference, and*
- (2) this device must accept any interference received, including interference that may cause undesired operation.*

## Copyright Notice

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## Revision History

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Revision	Revision History	Date
V1.0	First release	July 2004

## Technical Support

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If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.

 Visit the MSI website for FAQ, technical guide, BIOS updates, driver updates, and other information: [http://www.msi.com.tw/program/service/faq/faq/esc\\_faq\\_list.php](http://www.msi.com.tw/program/service/faq/faq/esc_faq_list.php)

 Contact our technical staff at: [support@msi.com.tw](mailto:support@msi.com.tw)

## Safety Instructions

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1. Always read the safety instructions carefully.
2. Keep this User's Manual for future reference.
3. Keep this equipment away from humidity.
4. Lay this equipment on a reliable flat surface before setting it up.
5. The openings on the enclosure are for air convection hence protects the equipment from overheating. **DO NOT COVER THE OPENINGS.**
6. Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
7. Place the power cord such a way that people can not step on it. Do not place anything over the power cord.
8. Always Unplug the Power Cord before inserting any add-on card or module.
9. All cautions and warnings on the equipment should be noted.
10. Never pour any liquid into the opening that could damage or cause electrical shock.
11. If any of the following situations arises, get the equipment checked by a service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated into the equipment.
  - The equipment has been exposed to moisture.
  - The equipment has not work well or you can not get it work according to User's Manual.
  - The equipment has dropped and damaged.
  - The equipment has obvious sign of breakage.
12. **DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT UNCONDITIONED, STORAGE TEMPERATURE ABOVE 60°C (140°F), IT MAY DAMAGE THE EQUIPMENT.**



**CAUTION:** Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.



**警告使用者:**

這是甲類的資訊產品，在居住的環境中使用時，可能會造成無線電干擾，在這種情況下，使用者會被要求採取某些適當的對策。

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# ***Getting Started***

The MS-9246 1U Rackmount Server is a high-performance barebone system powered by dual Intel® Xeon™ processors, Lindenhurst MCH, ICH5R/PXH PCI Bridges, and NS PC87366-ICK/VLA I/O Bridge. With high scalability, reliability, ease of use, and overall value, the MS-9246 makes an ideal choice for value conscious customers.



## Packing Checklist

Unpack the package and check if all items listed below are present. If any item contained in the package is damaged or missing, please contact your local dealer for replacement. In addition, keep the box and packing materials for possible future use.

Your MS-9246 1U Rackmount Server Barebone package should contain the following items:

**MS-9246 1U Rackmount Server**  
(includes a mainboard, an SSI EPS 1U Power Supply and a Fan Duct )



**User's Guide**



**Server Driver CD**



**Heatsink**



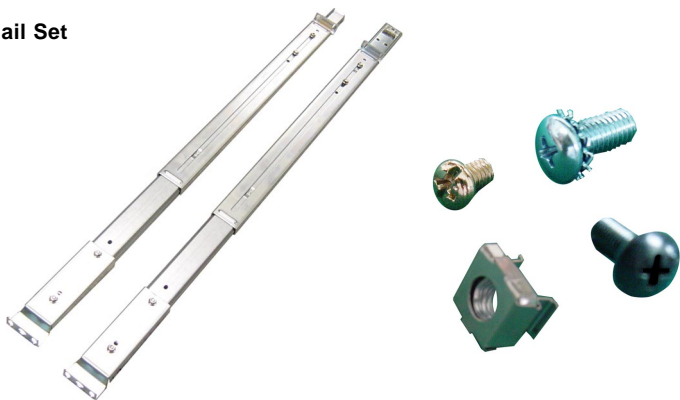
**Y-type PS/2 Converter**



**Ear Set**



**Rail Set**



**Power Supply Options**



Single Power



1 + 1 Redundant Power

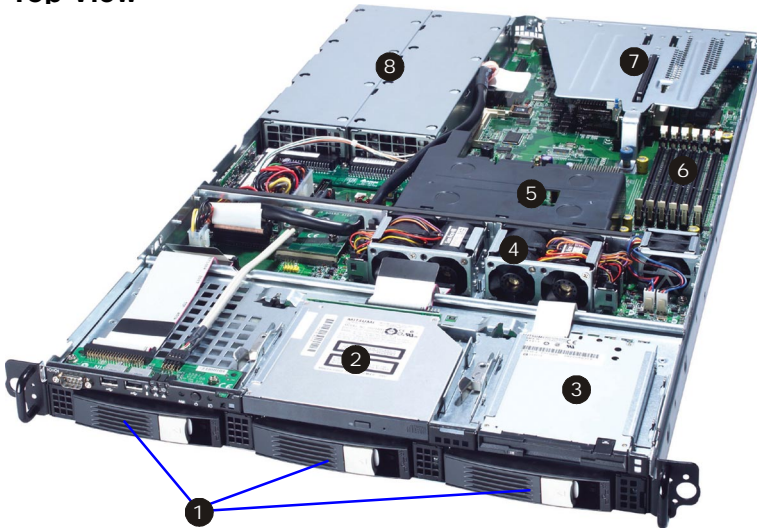


1 Redundant Power

## System Overview

This section shows the configuration of the MS-9246 from different angles, and the connectors and buttons on the front and back panel.

### Top View

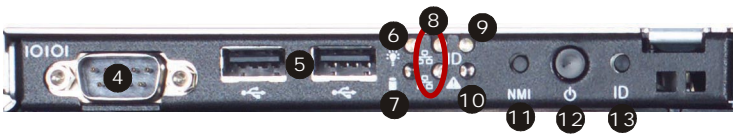


- ① HDD Tray
- ② Slim CD-ROM Drive
- ③ Slim Floppy Disk Drive
- ④ Axial Fan Module (redundant)
- ⑤ Fan Duct
- ⑥ Memory DIMM Slots
- ⑦ PCI Riser Card Bracket
- ⑧ SSI EPS 1U Power Supply

## Front View



## Front Bezel



### CD-ROM Drive

- ① Slim CD-ROM Drive

### Floppy Disk Drive

- ② Slim Floppy Disk Drive

### HDD Bay

- ③ Swappable Hard Disk Drive Bays

### Port

- ④ Serial Port
- ⑤ USB Ports

## **LED**

**6 Power LED**

This indicator shows the power status of the system. It glows when the main power is turned on.

**7 HDD Activity LED**

This indicator shows the activity status of the hard disk drive. It flashes when the system is accessing data on the hard disk and remains off when no disk activity is detected.

**8 Status LEDs of LAN# 1/2**

1. The green LED is on when there is an active connection on the LAN port.
2. This LED flashes when transmitting or receiving activities to or from the system are detected.

**9 System ID LED**

**10 System Status LED**

## **Button**

**11 NMI (Non-Maskable Interrupt) Switch**

**12 Power Button**

Press this button once to shut down the system, and then once to switch on.

**13 System ID Button**

**❖ Front Bezel LEDs**

LED	Color	State	Description
Power/Sleep	Green	On	Legacy power on/ACPI S0 state
		Blink (~1/sec)	Sleep/ACPI S1 state
	Off	Off	Power off/ACPI S4, S5 state
HDD Activity	Green	Blink	HDD access activity
	Off	Off	No disk activity
LAN1/LAN2 Activity	Green	On	LAN link
	Green	Blink	LAN access activity
System Status <b>w/ BMC</b>	Green	On	Running/normal operation
	Amber	On	Critical or non-recoverable condition
	Amber	Blink	Non-critical condition
	Off	Off	POST/system stop
System Status <b>w/o BMC</b>	Green	On	Running/normal operation
	Amber	On	Fan failure
	Off	Off	POST/system stop
System ID	Blue	On	Identify active via command or button
	Off	Off	No identification
Swappable HDD Power	Green	On	Power connected
	Off	Off	Power disconnected
Swappable HDD Status <b>w/ SAF-TE</b>	Green	Blink	HDD access
	Amber	On	Failure or rebuild stopped
	Amber	Blink (~1/sec)	Rebuild
	Amber	Blink (~3/sec)	Identification

## ❖ Diagnostic LEDs: DLED1/DLED2/DLED3/DLED4

### Memory LEDs:D29/D30/D31/D32/D33/D35

Component LEDs and four Diagnostic LEDs are integrated onboard, helping users diagnose their systems.

When POST or Service Processor detects an error, the corresponding LEDs light up to alert users to the condition and help service personnel identify the failing component. A system status LED on the front panel of the system first alerts users that an error has occurred. Service personnel next check inside the system to see which LED glows. This helps the service personnel to locate the failing component for replacement. The full failing path remains lit until POST no longer exists or the error is fixed.

The four Diagnostic LEDs can detect all problems that fail the system, such as VGA, RAM or other failures, and provide up to 16 combinations of signals to debug the system. Please refer to the following table for signal description.

 **DLED1**

























 **DLED2**





































 **DLED3**

 **Red**

 **Green**

 **DLED4**

D-LEDs	Description
1   2 3   4	System Power ON - The D-LED will hang here if the processor is damaged or not installed properly.
1   2 3   4	Early Chipset Initialization
1   2 3   4	Memory Detection Test - Testing onboard memory size. The D-LED will hang if the memory module is damaged or not installed properly.
1   2 3   4	Decompressing BIOS image to RAM for fast booting.
1   2 3   4	Initializing Keyboard Controller.
1   2 3   4	Testing VGA BIOS - This will start writing VGA sign-on message to the screen.

<b>D-LEDs</b>	<b>Description</b>
1   2 3   4	<b>Processor Initialization</b> - This will show information regarding the processor (like brand name, system bus, etc...)
1   2 3   4	<b>Testing RTC (Real Time Clock)</b>
1   2 3   4	<b>BIOS Sign On</b> - This will start showing information about logo, processor brand name, etc...
1   2 3   4	<b>Testing Base and Extended Memory</b> - Testing base memory from 240K to 640K and extended memory above 1MB using various patterns.
1   2 3   4	<b>Assign Resources to all ISA.</b>
1   2 3   4	<b>Initializing Hard Drive Controller</b> - This will initialize IDE drive and controller.
1   2 3   4	<b>Initializing Floppy Drive Controller</b> - This will initialize Floppy Drive and controller.
1   2 3   4	<b>Boot Attempt</b> - This will set low stack and boot via INT 19h.
1   2 3   4	<b>Operating System Booting</b>



**Rear View**



**Rear Bezel**

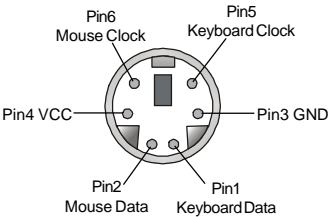


- ❶ VGA Port
- ❷ Gigabit LAN Jacks
- ❸ USB Ports
- ❹ Serial Port
- ❺ NMI Switch
- ❻ System ID Button
- ❼ System ID LED
- ❽ Ultra320 SCSI Connector
- ❾ PS/2 Keyboard/Mouse Connector (through Y-type converter)

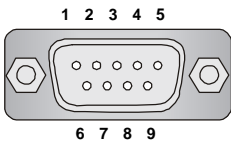
**❖ Rear Bezel LEDs**

LED	Color	State	Description
RJ45 NIC 1 Linkage /RJ45 NIC 2 Linkage	Green	On	LAN linked
	Green	Blinking	LAN accessing
	Off	Off	No LAN linked
RJ45 NIC 1 Access /RJ45 NIC 2 Access	Yellow	On	Gigabit mode access
	Green	On	100M mode access
	Off	Off	10M mode access
System ID	Blue	On	Identified as active via command or button

Mouse/Keyboard Connector

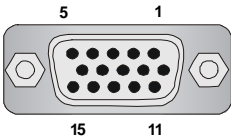


Serial Port



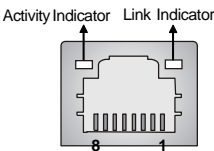
PIN	SIGNAL
1	DCD
2	SIN
3	SOUT
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

VGA Port



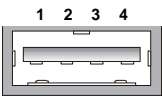
PIN	SIGNAL
1	RED
2	GREEN
3	BLUE
4	N/C
5	GND
6	GND
7	GND
8	GND
9	+5V
10	GND
11	N/C
12	SDA
13	Horizontal Sync
14	Vertical Sync
15	SCL

Gigabit LAN Jack



PIN	SIGNAL	DESCRIPTION
1	D0P	Differential Pair 0+
2	D0N	Differential Pair 0-
3	D1P	Differential Pair 1+
4	D2P	Differential Pair 2+
5	D2N	Differential Pair 2-
6	D1N	Differential Pair 1-
7	D3P	Differential Pair 3+
8	D3N	Differential Pair 3-

USB Port



PIN	SIGNAL
1	VCC
2	-Data
3	+Data
4	GND

SCSI Connector



68-Pin Ultra320 SCSI Connector

Pin	Description	Pin	Description
1	+DB(12)	35	-DB(12)
2	+DB(13)	36	-DB(13)
3	+DB(14)	37	-DB(14)
4	+DB(15)	38	-DB(15)
5	+DB(P1)	39	-DB(P1)
6	+DB(0)	40	-DB(0)
7	+DB(1)	41	-DB(1)
8	+DB(2)	42	-DB(2)
9	+DB(3)	43	-DB(3)
10	+DB(4)	44	-DB(4)
11	+DB(5)	45	-DB(5)
12	+DB(6)	46	-DB(6)
13	+DB(7)	47	-DB(7)
14	+DB(P)	48	-DB(P)
15	GROUND	49	GROUND
16	DIFFSENS	50	GROUND
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	RESERVED	53	RESERVED
20	GROUND	54	GROUND
21	+ATN	55	-ATN
22	GROUND	56	GROUND
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MST
27	+SEL	61	-SEL
28	+C/D	62	-C/D
29	+REQ	63	-REQ
30	+I/O	64	-I/O
31	+DB(8)	65	-DB(8)
32	+DB(9)	66	-DB(9)
33	+DB(10)	67	-DB(10)
34	+DB(11)	68	-DB(11)

## **System Specifications**

### **Mainboard**

- ◆ MS-9146 server board

### **CPU**

- ◆ Dual Intel® Xeon™ (800MHz FSB) processors in 604-pin package
- ◆ 1MB L2 cache
- ◆ 6.4GB/s transmission rate
- ◆ Core voltage: 1.10~1.40V
- ◆ VTT: 1.2V

### **Chipset**

- ◆ MCH: Intel® Lindenhurst (E7520) Memory Controller Hub
- ◆ PCI Bridge: Intel® PXH; Intel® ICH5R
- ◆ I/O Bridge: NS PC87366-ICK/VLA

### **Memory Bus Feature**

- ◆ Supports six dual-channel DDR266 (4-DIMM per channel)/DDR333 (3-DIMM per channel) registered ECC DIMMs
- ◆ Chipkill Support
- ◆ Maximum 24GB support with DDR266
- ◆ Maximum 16GB support with DDR333

### **Slots** (through the riser card by option for long card support)

- ◆ One PCI-X (64-bit/66MHz) slot
- ◆ One PCI-X (64-bit/133MHz) slot
- ◆ One PCI Express x8 slot (PCI Express Bus specification v1.0a compliant)

### **HDD Interface**

- ◆ SCSI interface supported by Adaptec AIC-7902 Ultra-320 SCSI controller (Optional)
  - Integrated Adaptec AIC-7902 Ultra-320 SCSI adapter
  - Supports dual-channel Ultra320 LVD SCSI
  - Supports Adaptec ZCR & Intel RAIDIOS (Zero-Channel RAID)
- ◆ Serial ATA RAID interface supported by Intel® ICH5R (with 2 SATA connectors onboard/can connect up to 2 Serial ATA drives)

### **Front Bezel I/O**

- ◆ 2 USB ports
- ◆ 1 serial port
- ◆ Power button/NMI switch/system ID button
- ◆ Power LED/HDD LED/LAN1 LED/LAN2 LED/system status LED/system ID LED
- ◆ Hot-swapping SCSI HDD trays (with HDD power LED & HDD access LED)

### **Rear Bezel I/O**

- ◆ PS/2 keyboard/mouse port (through Y-type converter)
- ◆ 2 USB ports

- ◆ 1 serial port
- ◆ 1 VGA port
- ◆ 2 RJ-45 Gigabit LAN jacks
- ◆ NMI switch/system ID button/system ID LED

### Network

- ◆ Intel® 82546GB Gigabit Ethernet Controller

### Server Management (Optional)

- ◆ QLogic Zircon UL BMC (Baseboard Management Controller)
  - Incorporates an embedded microcontroller, two System Management Bus (SMBus®) interfaces, a Chassis Management interface, Bi-color LED control, an integrated EEPROM, Fan control, ADC channels, and Digital Input Event and General-Purpose Input/Output pins.
  - Interfaces with the host via a slave SMBus interface; it interfaces with the LAN On Motherboard (LOM) and with peripherals via two independent master SMBus interfaces.

### Regulatory Approval

- ◆ Safety Compliance: UL, cUL, CCC/TUV
- ◆ Electromagnetic Compatibility (EMC): CE/FCC Class A, BSMI/VCCI/C-TOCK

### BIOS

- ◆ 8 Mbit Flash EEPROM
- ◆ PCI 2.2 compliant, VPD, and DMI
- ◆ SMBIOS 2.3, ACPI 2.0
- ◆ Supports PXE boot protocol
- ◆ APM 1.2, WOL, WOR
- ◆ PC2001 system design compliant

### Chassis Dimension

- ◆ 425mm (W) X 43.8mm (H) X 711mm (D)

### Power Supply

- ◆ 525 Watt
  - PFC function/SSI EPS 1U form factor/1 + 1 redundancy support
  - UL, cUL, TUV, CE, CB, CCC, and BSMI certified



#### MSI Reminds You...

*Enabling the functionality of Hyper-Threading Technology for your computer system requires ALL of the following platform Components:*

*\*CPU: Intel® Pentium® 4 or Xeon™ Processors with HT Technology;*

*\*Chipset: Intel® Chipsets that support HT Technology;*

*\*BIOS: A BIOS that supports HT Technology and has it enabled;*

*\*OS: An operating system that supports HT Technology.*

*For more information on Hyper-threading Technology, go to:*

***<http://www.intel.com/info/hyperthreading>***

**Video**

- ◆ Integrated ATI Radeon™ 7000 graphics controller
  - Built-in DVD decoding
  - Integrated TMDS transmitter with support for Digital Flat Panel (DFP) monitors
  - Onboard 8MB Video SDRAM


**MSI Reminds You...**

*Please refer to Table 1 for 2D modes supporting both CRT and LCD. The table specifies the minimum memory requirements for various display resolutions, refresh rates and color depths.*

**Table 1. 2D Modes (TFT or CRT)**

Mode	Refresh rate(Hz)	Minimum Amount of Memory Required			
		8bpp	16bpp	24bpp	32bpp
640x480	60	2MB	2MB	2MB	2MB
640X480	72	2MB	2MB	2MB	2MB
640X480	75	2MB	2MB	2MB	2MB
640X480	90	2MB	2MB	2MB	2MB
640X480	100	2MB	2MB	2MB	2MB
800X600	60	2MB	2MB	2MB	4MB
800X600	70	2MB	2MB	2MB	4MB
800X600	75	2MB	2MB	2MB	4MB
800X600	90	2MB	2MB	2MB	4MB
800X600	100	2MB	2MB	2MB	4MB
1024X768	60	2MB	2MB	4MB	4MB
1024X768	72	2MB	2MB	4MB	4MB
1024X768	75	2MB	2MB	4MB	4MB
1024X768	90	2MB	2MB	4MB	4MB
1024X768	100	2MB	2MB	4MB	4MB
1280x1024	43	2MB	4MB	4MB	6MB
1280x1024	60	2MB	4MB	4MB	6MB
1280x1024	70	2MB	-	4MB	6MB
1280x1024	72	2MB	-	4MB	6MB
1600x1200	66	4MB	4MB	6MB	8MB
1600x1200	76	4MB	4MB	6MB	-

Shading indicates modes not supported by TFT

### **MSI Server Management IPMI 1.5 (optional)**

- ◆ MSI-9569 BMC card (with QLogic Zircon UL BMC) and MSI iConsole AP support IPMI 1.5 (option)

#### **MS-9569 BMC Card Specification**

##### **BMC Chip**

- Qlogic Zircon UL ( ARM7 TDMI 32-bit/40MHz RISC), 128-pin PQFP
- Host hardware interface: LPC interface
- Host software interface: KCS interface

##### **Memory Size**

- 256 X 16 Bits SRAM
- 4M Bits Flash

##### **Form Factor**

- Add-on Card on CN7 SO-DIMM (144 pin, Key position in 50)

##### **Onboard I2Cmux**

- 9545

##### **Onboard Connector/Header**

- JTAG header (14 pin) for debugging

##### **Key Features**

- IPMI 1.5 Compliant
- Out-of-band LAN based management using RMCP
- FRU/SEL access
- Remote out-of-band alerts
- Event log
- Support for CLI (command line interface) over Serial or shared NIC (RMCP)
- Ability to update firmware inband unattended
- Remote access security (MD5)
- Out-of-band environmental monitoring and alerting
- Secure remote power control and system reset over Serial or shared NIC (RMCP)
- Support Microsoft EMS
- Support onboard I2C ADT 7463, Winbond 83791 to extend Hardware monitor feature
- Support ASR (Automatic Server Re-start)

##### **System Management**

Two SMBus 2.0 (I2C)

- One SMBus for Intel 82546GB
- One SMBus for ADT 7463, Winbond 83791, EEPROM access, CPU thermal sensor

CPU Fan speed control dependent on System Temperature

System Fan speed control dependent on System Temperature

##### **Sensor Management**

Monitored Voltage: +5V, +3.3V, Vcore

Thermal protection (CPU/System overheat shut down through BMC)

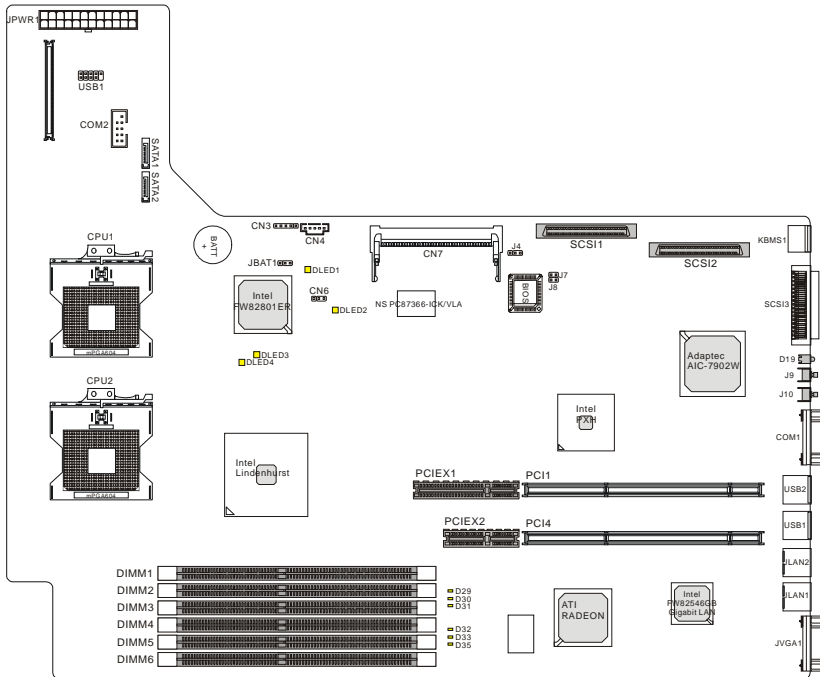
No Chassis Intrusion

LED x 3 (ID\_LED, BMC Heartbeat, Status LED )

On-Board Diagnostic LEDs ( 6 x Memory DIMM, 2 x CPU, 10 x FAN )

Support shared NIC (Intel 82546GB)

## Mainboard Layout



## MS-9146 v1.X Server Board

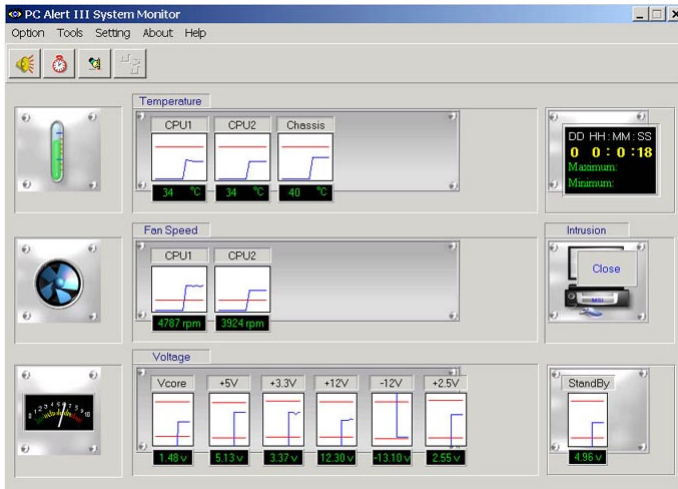
## MSI Special Features

### PC Alert™ III

The PC Alert™ III is a utility you can find in the CD-ROM disk. The utility is just like your PC doctor that can detect the following PC hardware status during real time operation:

- ✦ monitor CPU & system temperatures
- ✦ monitor fan speed(s)
- ✦ monitor system voltage
- ✦ monitor chassis intrusion

If one of the items above is abnormal, the program main screen will be immediately shown on the screen, with the abnormal item highlighted in red. This will continue to be shown until user disables the warning.



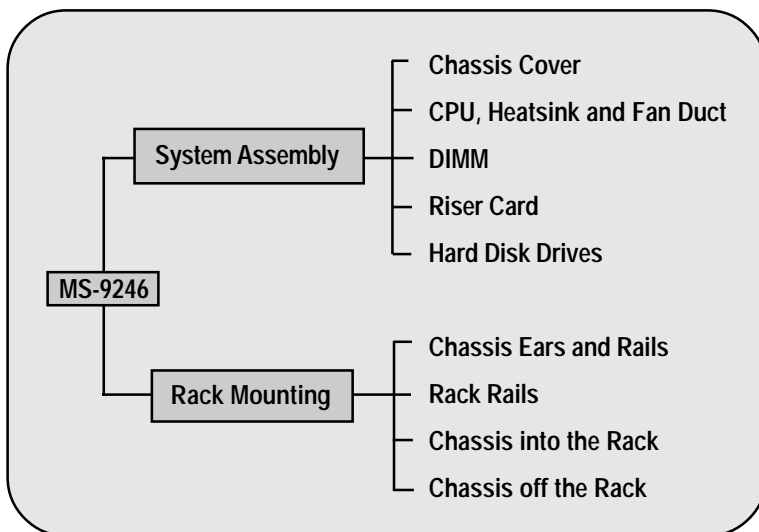
#### MSI Reminds You...

1. Items shown on PC Alert™ III vary depending on your system status.
2. The mainboard bound with MS-9569 BMC card (Server Management Features) won't support PC Alert™ III.



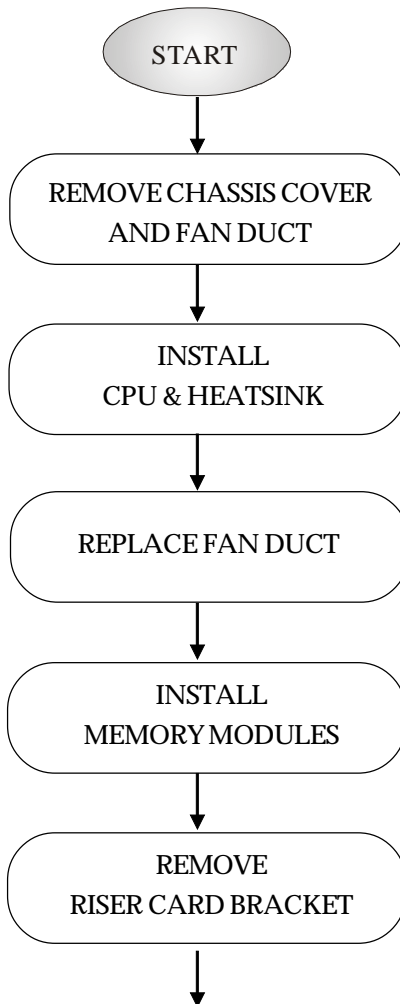
# System Hardware

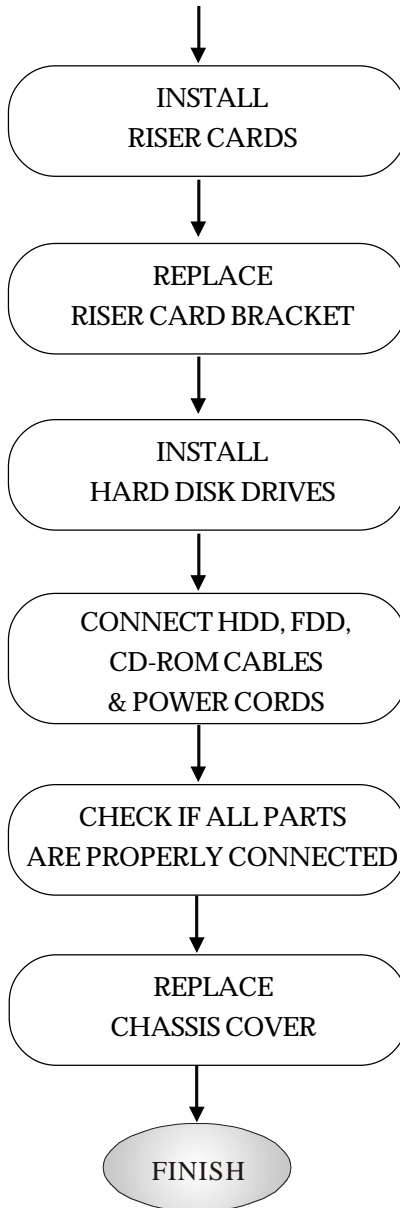
This chapter provides instructions on the hardware installation of the MS-9246 in two sections. **System Assembly** illustrates how to assemble each component of the MS-9246. **Rack Mounting** describes the procedures for mounting the unit into the rack in details. You can use the system assembly flowchart and the chart below to determine the proper sequence for removing or installing components to the server.



## System Assembly Flowchart

The following flowchart shows basic system assembly procedures. Please note that always wear anti-static gloves when handling electrical components and exercise caution during the installation process. For more information, contact your local dealer or experienced technician.





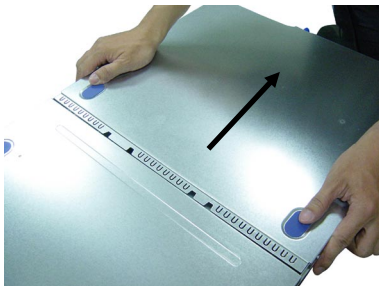
## System Assembly

### Removing the Chassis Cover

1. Loosen the thumbscrew on the rear bezel of the system.



2. Press the release buttons and slide the rear chassis cover backwards to remove it from the chassis.

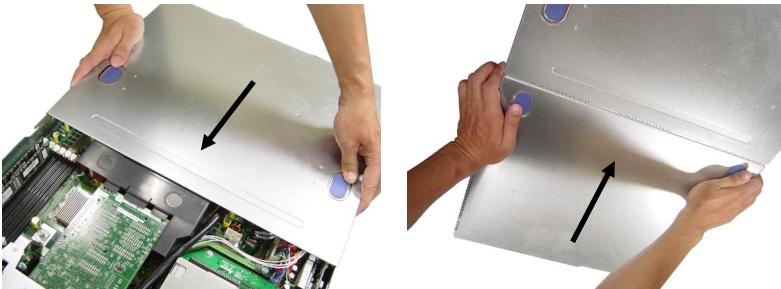


3. Press the release buttons and slide the front chassis cover forwards to remove it from the chassis.



## Replacing the Chassis Cover

1. Replace the front chassis cover and slide it backwards. Replace the rear chassis cover and slide it forwards.



2. Fasten the thumbscrew on the rear bezel of the system.



### **MSI Reminds You...**

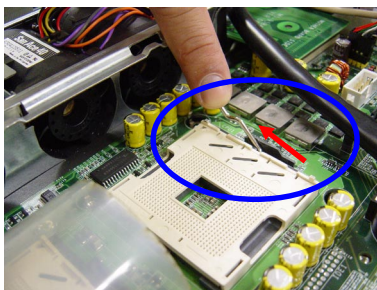
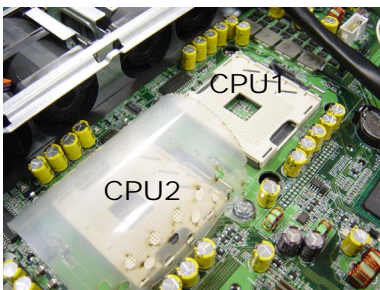
*Before you remove or install any components, make sure the server is not turned on or connected to the AC power.*

## **CPU, Heatsink, and Fan Duct**

1. On top of the CPU is a fan duct designed to enhance heat dissipation of the CPU. Lift up & remove the fan duct before installing the CPU.



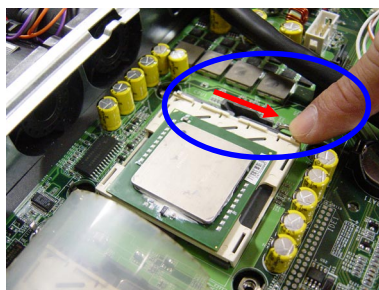
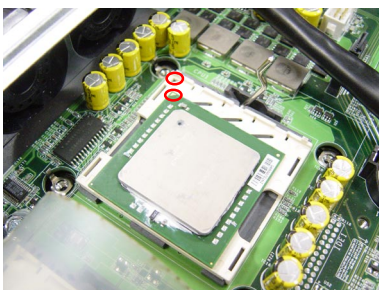
2. Locate the first CPU socket and raise the lever up to its full extent.



3. Locate the gold arrow on the CPU.

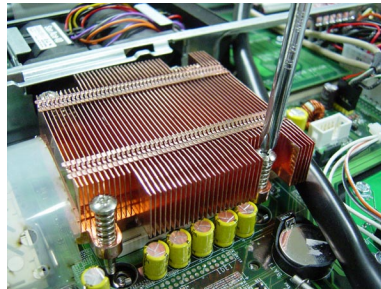
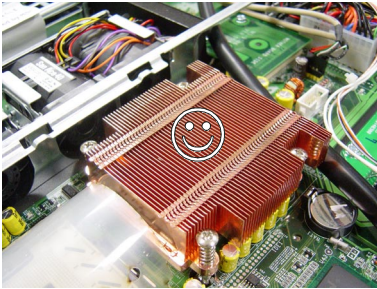


4. Place the CPU on top of the socket. Make sure to align the gold arrow on the CPU with the arrow key on the socket. Then push the lever down to secure the CPU in place.





5. Place the heat sink on top of CPU1 and secure the screws on both sides.

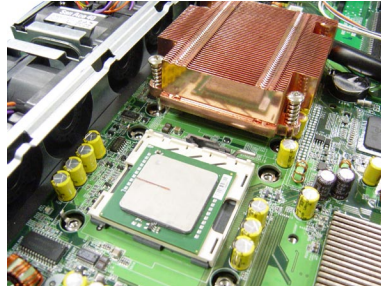
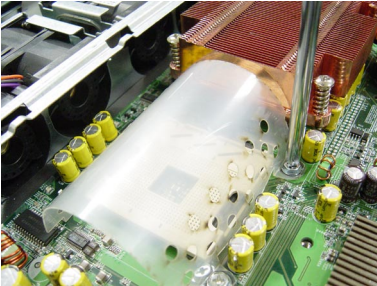


*Note: The heat sink has to be installed to prevent the CPU from overheating.*

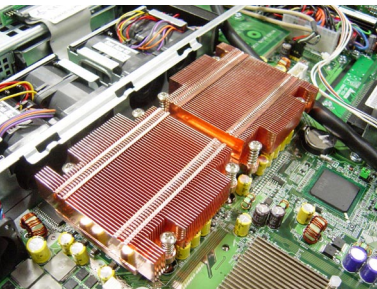
6. Remove the dummy heatsink on socket CPU2. Follow the same procedures to install the second CPU.



*Note: To install **DUAL** CPUs on the board, you must use **the same types of CPUs running at the same FSB frequency.***



7. Install the second heatsink.



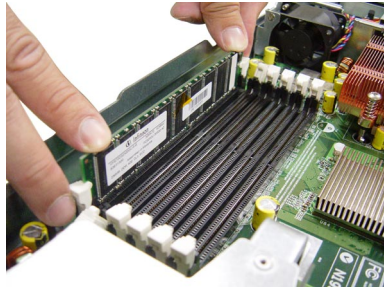
8. Replace the fan duct.



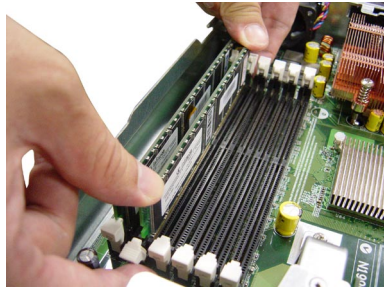
*Note: To ensure proper cooling, make sure the heatsinks & the fan duct are properly installed.*

## DDR Memory

1. Locate the DIMM slots on the mainboard. Insert the DIMM memory module vertically into the DIMM slot. Then push it in until the golden finger on the memory module is deeply inserted in the socket. The plastic clip at each side of the DIMM slot will automatically close.



2. For optimal system performance, at least two memory modules must be installed.



## Memory Bus Features

- ◆ Support for direct connect of two DDR channel interfaces, DDR266/DDR333 technology
- ◆ Full operation support in single-channel mode on either interface
- ◆ Stacked or unstacked DIMM support for registered DDR266 technology (up to four DIMMs per channel)
- ◆ Stacked or unstacked DIMM support for registered DDR333 technology (up to three DIMMs per channel)
- ◆ 144-bit wide with ECC, DDR266/DDR333 memory interface supports x72, ECC, registered DDR266/DDR333 DIMMs (using 128 Mb, 256 Mb, 512Mb, and 1 Gb)
- ◆ Maximum 16 GB support with DDR333 up to two stacked DIMMs (1 Gb x 4 DRAMs)
- ◆ Maximum 24 GB support with DDR266 up to two stacked DIMMs (1 Gb x 4 DRAMs)
- ◆ Data bandwidth per channel 2.13 GB/s (DDR266) / 2.7 GB/s (DDR333)
- ◆ Support for S4EC/D4ED (144,128) x4, Intel x4 Single Device Data Correction (x4 SDDC) ECC in dual channel mode
- ◆ Support SEC/DED (72,64) ECC on each channel when Intel Single Device Data Correction (SDDC) is disabled



## Memory Population Rules

The mainboard supports both single- & dual-channel modes. Install at least one DIMM module on the slots. You can install either single- or double-sided modules to meet your own needs. *In dual-channel mode, make sure that you install memory modules of **the same type and density** on DDR DIMMs “in pairs” -- {DIMM1 & DIMM2}, {DIMM3 & DIMM4}, {DIMM5 & DIMM6}.*

Memory modules can be installed in any combination as follows:

### DDR266 DIMM slot population

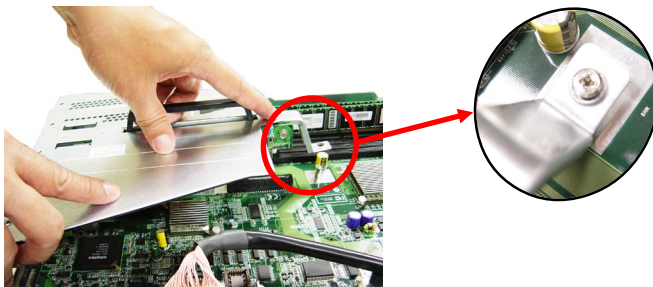
DIMM Configuration	DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6
2 Single Rank	X	X	X	X	Single Rank	Single Rank
2 Dual Rank	X	X	X	X	Dual Rank	Dual Rank
4 Single Rank	X	X	Single Rank	Single Rank	Single Rank	Single Rank
2 Dual Rank, 2 Single Rank	X	X	Dual Rank	Dual Rank	Single Rank	Single Rank
4 Dual Rank	X	X	Dual Rank	Dual Rank	Dual Rank	Dual Rank
6 Single Rank	Single Rank	Single Rank	Single Rank	Single Rank	Single Rank	Single Rank
2 Dual Rank, 4 Single Rank	Dual Rank	Dual Rank	Single Rank	Single Rank	Single Rank	Single Rank
4 Dual Rank, 2 Single Rank	Dual Rank	Dual Rank	Dual Rank	Dual Rank	Single Rank	Single Rank
6 Dual Rank	Dual Rank	Dual Rank	Dual Rank	Dual Rank	Dual Rank	Dual Rank

### DDR333 DIMM slot population

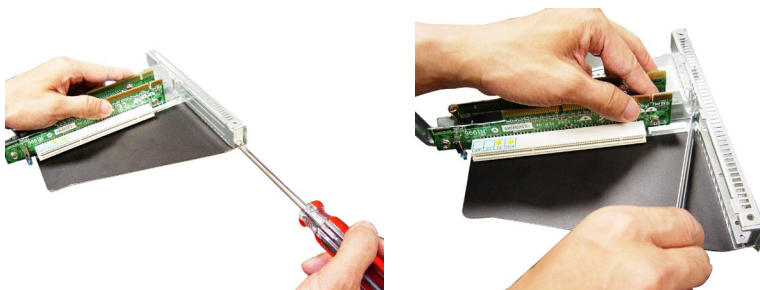
DIMM Configuration	DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6
1 Single Rank	X	X	X	X	Single Rank	Single Rank
1 Dual Rank	X	X	X	X	Dual Rank	Dual Rank
2 Single Rank	X	X	Single Rank	Single Rank	Single Rank	Single Rank
1 Dual Rank, 1 Single Rank	X	X	Dual Rank	Dual Rank	Single Rank	Single Rank
2 Dual Rank	X	X	Dual Rank	Dual Rank	Dual Rank	Dual Rank
3 Single Rank	Single Rank	Single Rank	Single Rank	Single Rank	Single Rank	Single Rank
1 Dual Rank, 2 Single Rank	Dual Rank	Dual Rank	Single Rank	Single Rank	Single Rank	Single Rank

## PCI Expansion Card

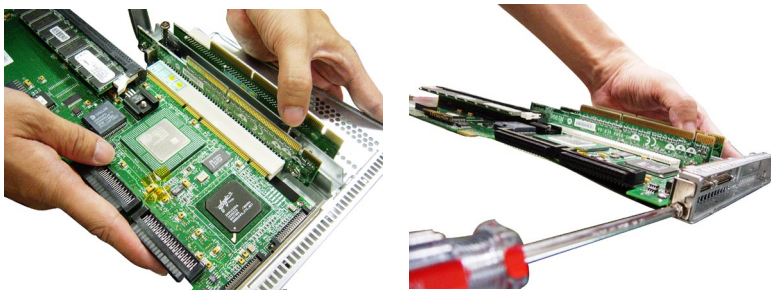
1. Locate the riser card bracket on the chassis. A standoff guide is designed as alignment guidance for installation of the riser card bracket to avoid damage of the riser card golden fingers. Lift the bracket up from the chassis (NO screwdriver is needed).



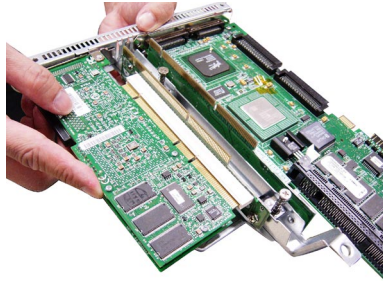
2. Unscrew the cover plates and put them aside for later use.



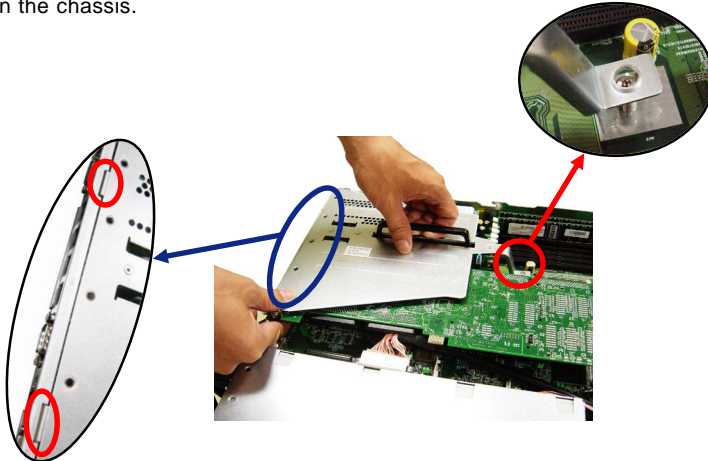
3. Insert the expansion card into an appropriate PCI slot on the riser card and secure the screw with a screwdriver.



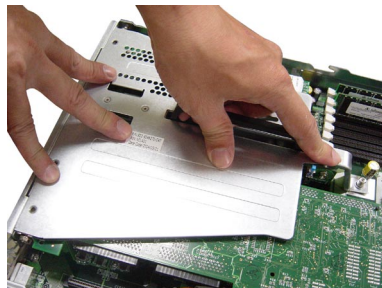
4. Install the second PCI expansion card if necessary.



5. Place the riser card bracket on top of the PCI slots on the motherboard. Align the riser card golden fingers with the PCI slots. Then aim the front end of the riser card bracket at the standoff guide and align the rear part of the bracket with the U-shaped cuts on the chassis.



6. Push the riser card bracket carefully down with even force on both sides.



## PCI Riser Card (Optional)

Apart from the standard PCI riser cards assembled in the system, an optional riser card is available upon request. Please refer to the following for detailed specs and the instructions on riser card installation.

### Standard PCI Riser Cards: MS-9583, MS-9584

MS-9583: one 64-bit/100MHz PCI-X slot (for low profile card; with ZCR support)

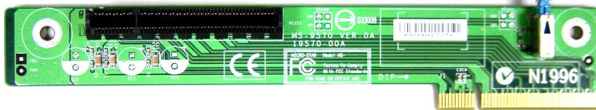


MS-9584: one 64-bit/133MHz PCI-X slot (for long card support)

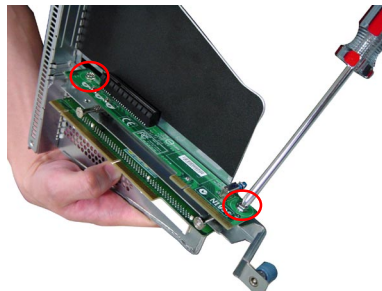
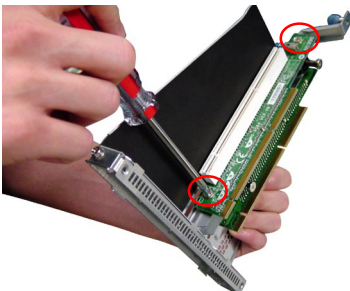


### Optional PCI Riser Card: MS-9570

MS-9570: one PCI Express x 8 slot (option for long card support)



1. Unscrew the original PCI riser card for replacement.
2. Align the screw holes of the new riser card with the holes on the riser card bracket. Screw to secure the new riser card to the bracket.



## **SCSI HDD**

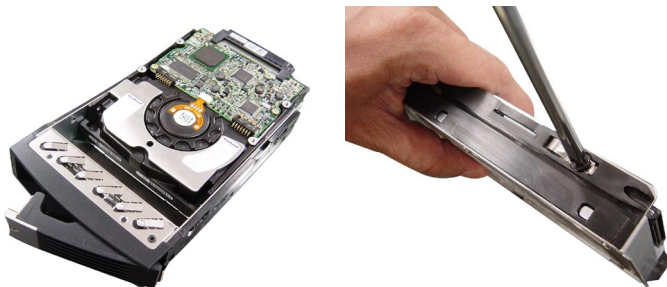
1. To release the hot-swapping HDD tray, flip open the tray lever and pull the tray out of the bay.



2. Unscrew the HDD tray and take the tray out.



3. At the sides of the HDD are four screw holes, two on each side. Users will find on the HDD rack four identical screw holes as on the HDD. Place the HDD into the rack and align the screw holes on the HDD with the ones on the rack. Secure the HDD with four screws supplied by the HDD vendor.



4. Insert the HDD set into the bay and press the lever back in place.



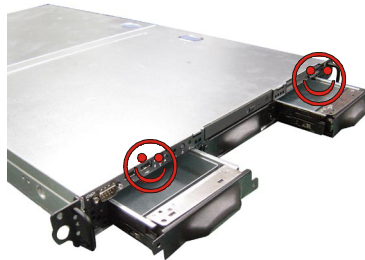


## **Serial ATA HDD**

1. To release the hot-swapping HDD holder, unscrew it and pull it out.



2. As the system mainboard supports two Serial ATA HDDs, only the HDD trays on the right & left sides can be used.



3. Unscrew the HDD tray and take the tray out.



4. At the sides of the HDD are four screw holes, two on each side. Users will find on the HDD rack four identical screw holes as on the HDD. Place the HDD into the rack and align the screw holes on the HDD with the ones on the rack. Secure the HDD with four screws supplied by the HDD vendor.



5. Insert the HDD set into the bay and push it back in place.



6. Screw the HDD set securely back to the system.

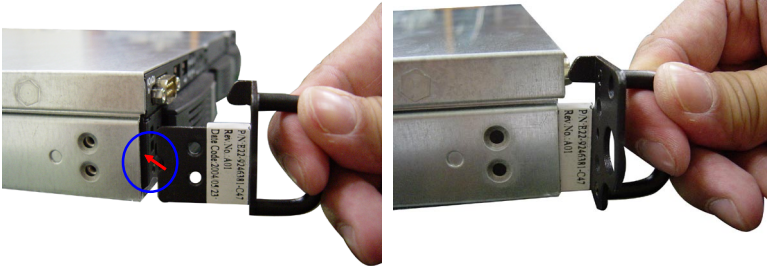




## Rack Mounting

### Chassis Ears

1. Insert the chassis ear into the chassis (as marked below).



2. Push it in until it fits firmly. Screw to secure the chassis ear.



3. Follow the same procedures to install the second chassis ear.

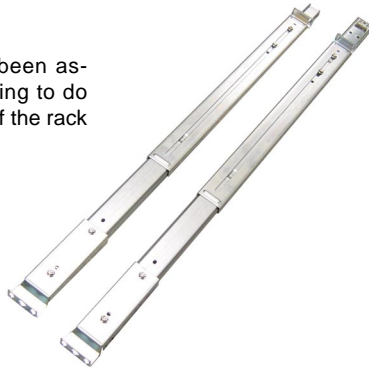


## Chassis Rails

1. The chassis rails and rack rails have been assembled together beforehand. The first thing to do with the rail set is to take the chassis rails off the rack rails.



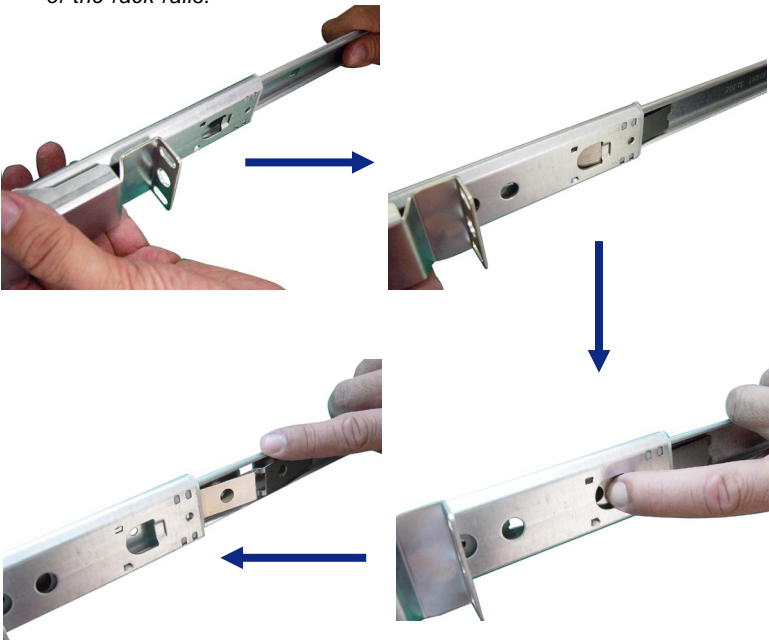
**Note:** The chassis rail engraved with "RIGHT SLIDE" on the inner side should be screwed to the right side of the chassis whereas the "LEFT SLIDE" should be screwed to the left side.



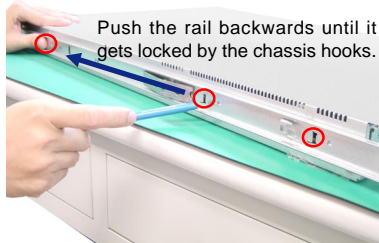
2. Pull the chassis rail gently out until the locking tab locks the rail.
3. Simultaneously press down the locking tab and pull out the chassis rail. The chassis rail should slide easily off the rack rail.
4. Follow the same procedures to disassemble the second chassis rail.



**Note:** The chassis rail is designed with a locking tab which can (1) hold the system firmly to the rack, and (2) lock the system halfway without sliding out of the rack rails.

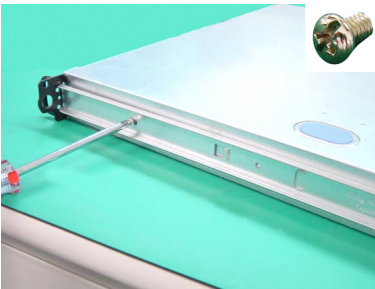


5. On each side of the chassis are three hooks to lock the chassis rail. First align the chassis hooks with the holes on the rail. Secure the rail to the chassis and push the rail backwards until it gets locked by the chassis hooks.



**Note:** The chassis rail engraved with "RIGHT SLIDE" on the inner side should be screwed to the right side of the chassis whereas the "LEFT SLIDE" should be screwed to the left side.

6. Screw the chassis rail to the chassis. Each chassis rail has two screw holes. Follow the same procedures to install the second chassis rail.



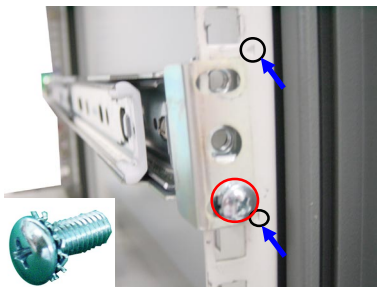
## **Rack Rails**

1. Locate the triangle mark on the rack and install 3 screw holders to the rack as shown.



2. Align the rack rail with the rack and screw the rail to the rack by securing one screw to the bottom screw holder.

3. Follow the same procedures to secure the rail on the rear and to install the second rack rail.



### Cable Arm (Optional)

An optional cable arm is available to help tidy the system cables up.

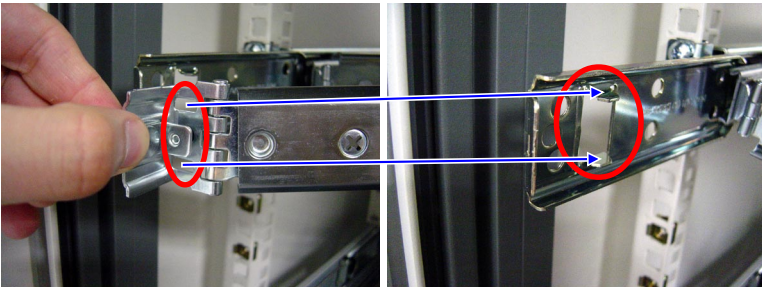
The cable arm attaches to the rear of the server and the system rack, allowing cables to move as the server slides back and forth within the rack cabinet.



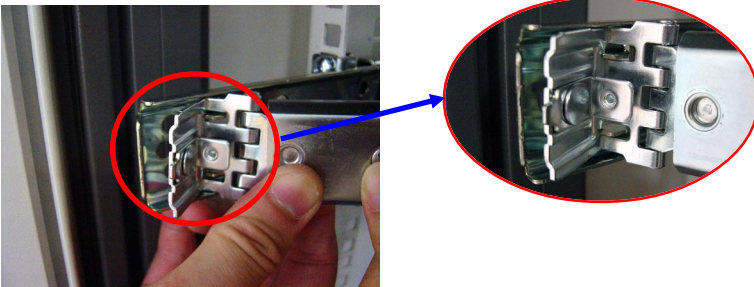
1. First screw the **right** rack rail to the rack. Go check the right rail on the rear (virtually the left rail if viewed from the rear of the cabinet) and you'll find the cable arm holder at the end of the rail. Insert the clip (the narrow end) of the cable arm into the cable arm holder and push it forwards until you hear a 'clip' sound.



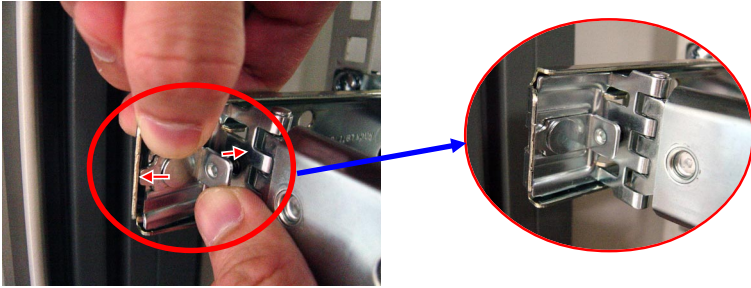
2. At the other end of the cable arm are two holes. Align the holes of the cable arm with the tabs on the rack rail (as indicated by circles and arrows).



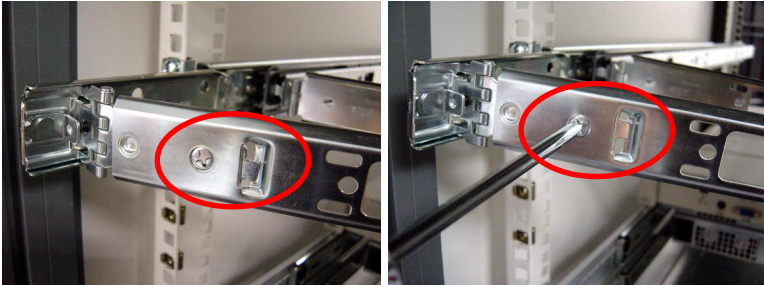
3. Fit the tabs into the holes.



4. Simultaneously press down the right end of the locking mechanism and push the left end gently forwards to lock it into the hole at the end of the rack rail. The installation of the cable arm is completed at this point. Users may tidy the server cables up and tie-wrap them to the cable arm.



5. A screw-knob is designed for users to adjust the angles (up or down) of the cable arm. Use a screwdriver to turn the screw-knob clockwise or counterclockwise and the cable arm will go up or down.



6. Users may disassemble the cable arm following the above procedures in reverse order.



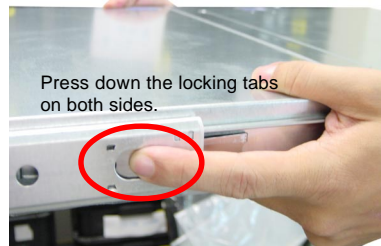
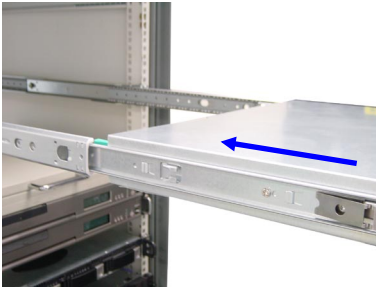


## Chassis into the Rack

1. To slide the system into the rack, first align the chassis rails with the rack rails and push the system backwards until the locking tab clicks.
2. Simultaneously press down the locking tabs on both sides of the chassis rails and push the system backwards. The system should slide easily into the rack.



**Note:** The chassis rail is designed with a locking tab which can (1) hold the system firmly to the rack, and (2) lock the system halfway without sliding out of the rack rails.



3. Screw the system firmly to the rack.



## Chassis off the Rack

1. To slide the system off the rack, first seize the system by its ears and gently pull the system out.



2. The system will be locked halfway while being pulled out. Simultaneously press down the locking tabs on both sides of the chassis and pull the system forwards. The system should slide easily off the rack.



**Note:** The chassis rail is designed with a locking tab which can (1) hold the system firmly to the rack, and (2) lock the system halfway without sliding out of the rack rails.



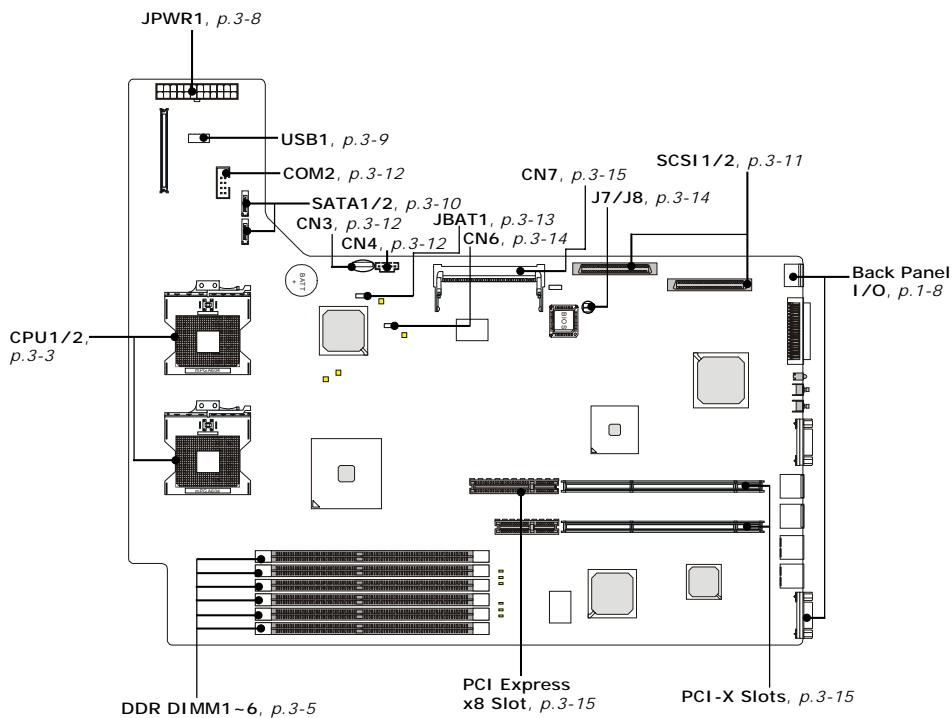
# 3

## ***Mainboard Hardware***

This chapter provides you with the information about hardware setup procedures. While doing the installation, be careful in holding the components and follow the installation procedures. For some components, if you install in the wrong orientation, the components will not work properly.

Use a grounded wrist strap before handling computer components. Static electricity may damage the components.

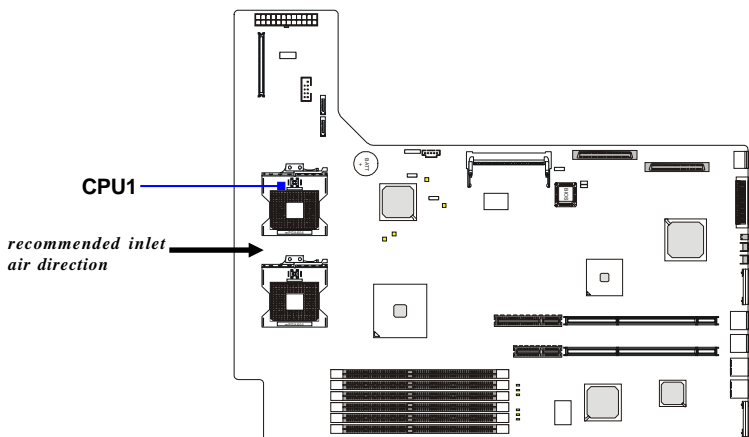
## Quick Components Guide



## Central Processing Unit: CPU

The mainboard supports **Single/Dual** Intel® Xeon™ processor(s). The mainboard uses two CPU sockets called Socket 603/604 for easy CPU installation. You can install SINGLE or DUAL CPUs on the board to meet your own needs. Keep the following points in mind before installing CPU(s):

1. If **SINGLE** CPU is intended, always install the CPU on the **CPU1** socket and install a dummy heatsink on the CPU2 socket, which will direct inlet air to the CPU1 socket for better heat dissipation.



2. To install **DUAL** CPUs on the board, you must use **the same type of CPUs running at the same FSB frequency**.

When you are installing the CPU, **make sure the CPU has a heatsink and a cooling fan attached on the top to prevent overheating**. If you do not find the Heat Sink and cooling fan, contact your dealer to purchase and install them before turning on the computer.



### MSI Reminds You...

*Overheating will seriously damage the CPU and system, always make sure the cooling fan can work properly to protect the CPU from overheating.*

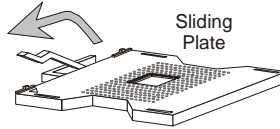
*The system temperature needs to remain under 45°C.*

*We highly recommend that the direction of inlet air should follow the direction indicated above for better cooling effect.*

## CPU Installation Procedures for Socket 604

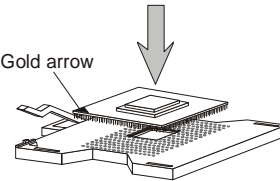
1. Please turn off the power and unplug the power cord before installing the CPU.
2. Pull the lever sideways away from the socket. Make sure to raise the lever up to a 170-degree angle.
3. Look for the gold arrow. The gold arrow should point towards the lever pivot. The CPU can only fit in the correct orientation.
4. If the CPU is correctly installed, the pins should be completely embedded into the socket and can not be seen. Please note that any violation of the correct installation procedures may cause permanent damages to your mainboard.
5. Press the CPU down firmly into the socket and close the lever. As the CPU is likely to move while the lever is being closed, always close the lever with your fingers pressing tightly on top of the CPU to make sure the CPU is properly and completely embedded into the socket.

Open Lever



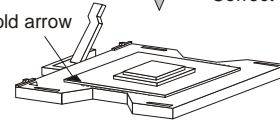
Sliding Plate

Gold arrow



Correct CPU placement

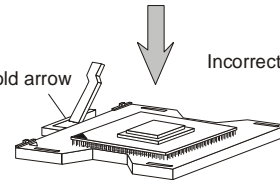
Gold arrow



O

Incorrect CPU placement

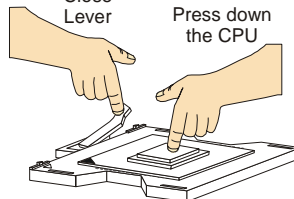
Gold arrow



X

Close Lever

Press down the CPU

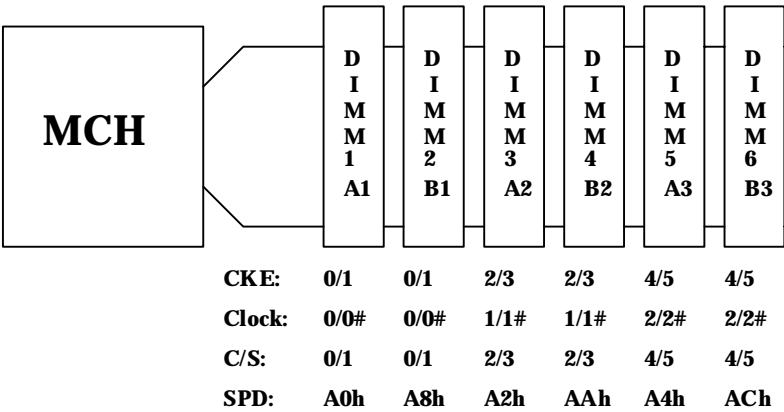


## Memory

The mainboard provides 6 slots for 184-pin DDR DIMM (Double In-Line Memory Module) modules. You can install PC2100/DDR266 or PC2700/DDR333 DDR SDRAM modules on the DDR DIMM slots (DIMM 1~6).

### Memory Bus Features

- ◆ Support for direct connect of two DDR channel interfaces, DDR266/DDR333 technology
- ◆ Full operation support in single-channel mode on either interface
- ◆ Stacked or unstacked DIMM support for registered DDR266 technology(up to four DIMMs per channel)
- ◆ Stacked or unstacked DIMM support for registered DDR333 technology(up to three DIMMs per channel)
- ◆ 144-bit wide with ECC, DDR266/DDR333 memory interface supports x72, ECC, registered DDR266/DDR333 DIMMs (using 128 Mb, 256 Mb, 512Mb, and 1 Gb)
- ◆ Maximum 16 GB support with DDR333 up to two stacked DIMMs(1 Gb x4 DRAMs)
- ◆ Maximum 24 GB support with DDR266 up to two stacked DIMMs(1 Gb x4 DRAMs)
- ◆ Data bandwidth per channel 2.13 GB/s (DDR266) / 2.7 GB/s (DDR333)
- ◆ Support for S4EC/D4ED (144,128) x4, Intel x4 Single Device Data Correction (x4 SDDC) ECC in dual channel mode
- ◆ Support SEC/DED (72,64) ECC on each channel when Intel Single Device Data Correction (SDDC) is disabled



## Memory Population Rules

The mainboard supports both single- & dual-channel modes. Install at least one DIMM module on the slots. You can install either single- or double-sided modules to meet your own needs. *In dual-channel mode, make sure that you install memory modules of **the same type and density** on DDR DIMMs “in pairs” -- {DIMM1 & DIMM2}, {DIMM3 & DIMM4}, {DIMM5 & DIMM6}.*

Memory modules can be installed in any combination as follows:

### DDR266 DIMM slot population

DIMM Configuration	DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6
2 Single Rank	X	X	X	X	Single Rank	Single Rank
2 Dual Rank	X	X	X	X	Dual Rank	Dual Rank
4 Single Rank	X	X	Single Rank	Single Rank	Single Rank	Single Rank
2 Dual Rank, 2 Single Rank	X	X	Dual Rank	Dual Rank	Single Rank	Single Rank
4 Dual Rank	X	X	Dual Rank	Dual Rank	Dual Rank	Dual Rank
6 Single Rank	Single Rank	Single Rank	Single Rank	Single Rank	Single Rank	Single Rank
2 Dual Rank, 4 Single Rank	Dual Rank	Dual Rank	Single Rank	Single Rank	Single Rank	Single Rank
4 Dual Rank, 2 Single Rank	Dual Rank	Dual Rank	Dual Rank	Dual Rank	Single Rank	Single Rank
6 Dual Rank	Dual Rank	Dual Rank	Dual Rank	Dual Rank	Dual Rank	Dual Rank

### DDR333 DIMM slot population

DIMM Configuration	DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6
1 Single Rank	X	X	X	X	Single Rank	Single Rank
1 Dual Rank	X	X	X	X	Dual Rank	Dual Rank
2 Single Rank	X	X	Single Rank	Single Rank	Single Rank	Single Rank
1 Dual Rank, 1 Single Rank	X	X	Dual Rank	Dual Rank	Single Rank	Single Rank
2 Dual Rank	X	X	Dual Rank	Dual Rank	Dual Rank	Dual Rank
3 Single Rank	Single Rank	Single Rank	Single Rank	Single Rank	Single Rank	Single Rank
1 Dual Rank, 2 Single Rank	Dual Rank	Dual Rank	Single Rank	Single Rank	Single Rank	Single Rank

## Memory Speed/CPU FSB Support Matrix

	DDR266	DDR333
FSB800	OK	OK

## Installing DDR Modules

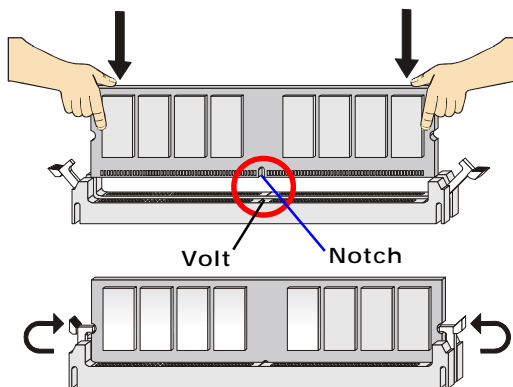
1. The DDR DIMM has only one notch on the center of module. The module will only fit in the right orientation.
2. Insert the DIMM memory module vertically into the DIMM slot. Then push it in until the golden finger on the memory module is deeply inserted in the socket.



### MSI Reminds You...

*You can barely see the golden finger if the module is properly inserted in the socket.*

3. The plastic clip at each side of the DIMM slot will automatically close.

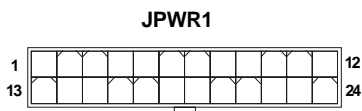


## Power Supply

Before inserting the power supply connector, always make sure that all components are installed properly to ensure that no damage will be caused.

### SSI 24-Pin Power Connector: JPWR1

To connect to the SSI power supply, make sure the plug of the power supply is inserted in the proper orientation and the pins are aligned. Then push down the power supply firmly into the connector.



**JPWR1 Pin Definition**

PIN	SIGNAL	PIN	SIGNAL
1	+12V	13	GND
2	+12V	14	GND
3	+12V	15	GND
4	+12V	16	+5V
5	+12V	17	+5V
6	+3.3V	18	GND
7	+3.3V	19	GND
8	+3.3V	20	-12V
9	GND	21	+3.3V
10	5VSB	22	GND
11	PWROK	23	GND
12	PS_ON#	24	GND



#### MSI Reminds You...

1. Power supplies of 300watt (and up) are highly recommended for system stability.
2. Please refer to the Intel/AMD websites for recommended power supplies.



## Connectors

The mainboard provides connectors to connect to FDD, IDE HDD, case, LAN, USB ports, CPU/system power supply fans, ... and etc.

### Front USB Connector: USB1

The mainboard provides one USB 2.0 pin header *USB1* (optional USB 2.0 bracket available) that is compliant with Intel® I/O Connectivity Design Guide. USB 2.0 technology increases data transfer rate up to a maximum throughput of 480Mbps, which is 40 times faster than USB 1.1, and is ideal for connecting high-speed USB interface peripherals such as **USB HDD, digital cameras, MP3 players, printers, modems and the like.**

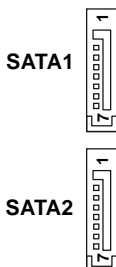


Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	USBPWR	2	USBPWR
3	USBP4-	4	USBP5-
5	USBP4+	6	USBP5+
7	GND	8	GND
9	NC	10	USBOC

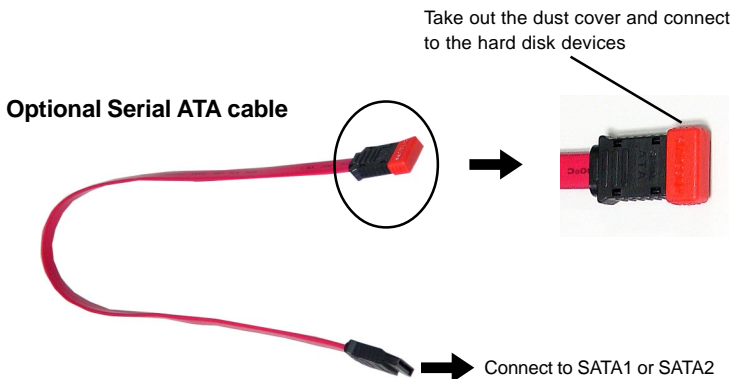
## Serial ATA RAID 0, 1 Connectors: SATA1, SATA2 (Optional)

The southbridge Intel® ICH5R provides a hybrid solution that combines two independent SATA ports for support of up to two Serial ATA (Serial ATA RAID) drives and utilizes its proprietary Serial ATA RAID Software to support RAID levels 0 and 1 for easy management of the storage subsystems. Both connectors support 1<sup>st</sup> generation serial ATA data rates of 150 MB/s and are fully compliant with Serial ATA 1.0 specifications.



**SATA1/2 Pin Definition**

PIN	SIGNAL	PIN	SIGNAL
1	GND	2	TXP
3	TXN	4	GND
5	RXN	6	RXP
7	GND		



### **MSI Reminds You...**

*Please do not fold the Serial ATA cable into 90-degree angle. Otherwise, data loss may occur during transmission.*

Ultra320 SCSI Connectors: SCSI1/SCSI2 (Optional)

SCSI (Small Computer System Interface) is a parallel interface standard for attaching peripheral devices to computers. Ultra320 SCSI is the seventh generation of SCSI I/O technology, and has a maximum data rate speed of 320 MB/sec. SCSI's commitment to backward compatibility and legacy support are the primary reasons for its durability as an I/O interface, making SCSI the industry standard for disk drive connection in virtually all high-performance servers.

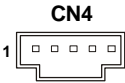


68-Pin Ultra320 SCSI Connector

Pin	Description	Pin	Description
1	+DB(12)	35	-DB(12)
2	+DB(13)	36	-DB(13)
3	+DB(14)	37	-DB(14)
4	+DB(15)	38	-DB(15)
5	+DB(P1)	39	-DB(P1)
6	+DB(0)	40	-DB(0)
7	+DB(1)	41	-DB(1)
8	+DB(2)	42	-DB(2)
9	+DB(3)	43	-DB(3)
10	+DB(4)	44	-DB(4)
11	+DB(5)	45	-DB(5)
12	+DB(6)	46	-DB(6)
13	+DB(7)	47	-DB(7)
14	+DB(P)	48	-DB(P)
15	GROUND	49	GROUND
16	DIFFSENS	50	GROUND
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	RESERVED	53	RESERVED
20	GROUND	54	GROUND
21	+ATN	55	-ATN
22	GROUND	56	GROUND
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MST
27	+SEL	61	-SEL
28	+C/D	62	-C/D
29	+REQ	63	-REQ
30	+I/O	64	-I/O
31	+DB(8)	65	-DB(8)
32	+DB(9)	66	-DB(9)
33	+DB(10)	67	-DB(10)
34	+DB(11)	68	-DB(11)

**IPMB Power Connector: CN4**

This connector is used to connect the power supply of the IPMB (Intelligent Platform Management Bus).



**Pin Definition**

PIN	SIGNAL
1	SMB clock
2	SMB data
3	PS alert
4	GND
5	3.3RS

**5-pin IPMB Connector: CN3**

The mainboard provides IPMB (Intelligent Platform Management Bus) connectors for users to connect the BMC (Baseboard Management Controller) card.

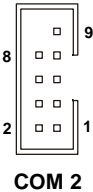


**CN3 Pin Definition**

PIN	SIGNAL
1	P3V3_AUX
2	GND
3	NC
4	SMBDATA
5	SMBCLK

**Serial Port Connector: COM 2**

The mainboard provides one 9-pin header as serial port COM 2. The port is a 16550A high speed communication port that sends/receives 16 bytes FIFOs. You can attach a serial mouse or other serial devices directly to it.



**Pin Definition**

PIN	SIGNAL	DESCRIPTION
1	DCD	Data Carry Detect
2	SIN	Serial In or Receive Data
3	SOUT	Serial Out or Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicate

## Jumpers

The motherboard provides the following jumpers for you to set the computer's function. This section will explain how to change your motherboard's function through the use of jumpers.

### Clear CMOS Jumper: JBAT1

There is a CMOS RAM onboard that has a power supply from external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, use the JBAT1 (Clear CMOS Jumper) to clear data.

**JBAT1**



Keep Data



Clear Data

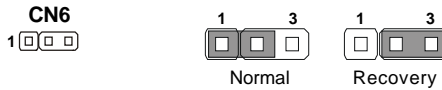


#### **MSI Reminds You...**

*You can clear CMOS by shorting 2-3 pin while the system is off. Then return to 1-2 pin position. Avoid clearing the CMOS while the system is on; it will damage the mainboard.*

### BIOS Recovery Jumper: CN6

Users can short connect pin#2-3 to recover the system BIOS with a Recovery Floppy. When the system is done with the job, the buzzer will beep to remind the user to set the jumper to its normal state (pin#1-2 short connected).



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### Clear BIOS Password Jumper: J7

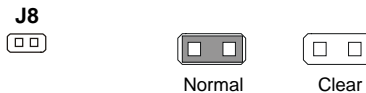
The jumper is used to clear the BIOS password. To clear the password, open the jumper and restart your computer.



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### Clear Event Log Jumper: J8

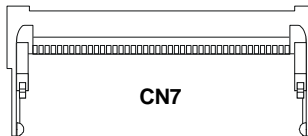
The jumper is used to clear the system event logs. To clear the system event logs, open the jumper and restart your computer.



## Slots

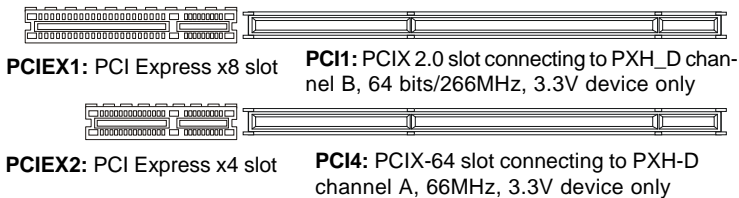
### SO DIMM (Small Outline DIMM)

The SO DIMM has 144 pins and supports a full 64-bit transfer. It is specifically designed for users to install MSI's proprietary server management tool -- MS-9569 BMC (Baseboard Management Controller) card.



### PCI (Peripheral Component Interconnect) Slots

The motherboard provides two 64-bit PCI-X slots, one PCI Express x4 slot, and one PCI Express x8 slot.



#### MSI Reminds You...

*When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.*

# BIOS Setup

This chapter provides information on the BIOS Setup program and allows you to configure the system for optimum use. You may need to run the Setup program when:

- ◆ An error message appears on the screen during the system booting up, and requests you to run SETUP.
- ◆ You want to change the default settings for customized features.



## MSI Reminds You...

1. The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

2. Upon boot-up, the 1st line appearing after the memory count is the BIOS version. It is usually in the format:

*P9146MS V1.0 150304 where:*

*1st digit refers to BIOS maker as A = AMI, W = AWARD, and P = PHOENIX.*

*2nd - 5th digit refers to the model number.*

*6th - 7th digit refers to the customer as MS = all standard customers.*

*V1.0 refers to the BIOS version.*

*150304 refers to the date this BIOS was released.*



## Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <F2> key to enter Setup.

Press F2 to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it OFF and On or pressing the RESET button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

## Control Keys

Key	Function
<F1> or <Alt-H>	General Help window
<Esc>	Exit this menu
↔ arrow keys	Select a different menu
↑ or ↓ arrow keys	Move cursor up and down
<Home> or <End>	Move cursor to top or bottom of window
<PgUp> or <PgDn>	Move cursor to next or previous page
<F5> or <->	Select the previous value for the field
<F6> or <+> or <Space>	Select the next value for the field
<F9>	Load the default configuration values for this menu
<F10>	Save and exit
<Enter>	Execute command or enter submenu

## Getting Help

After entering the Setup menu, the first menu you will see is the Main Menu.

### Main Menu

The main menu lists the setup functions you can make changes to. You can use the arrow keys (  $\uparrow\downarrow$  ) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

### Sub-Menu

If you find a right pointer symbol (as shown in the right view) appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use arrow keys (  $\uparrow\downarrow$  ) to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc>.

### General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

- Primary IDE Master
- Primary IDE Slave
- Secondary IDE Master
- Secondary IDE Slave

## The Menu Bar

Once you enter **PhoenixBIOS Setup Utility**, the Main Menu will appear on the screen. On the Main Menu screen, you will see basic BIOS settings including system time & date, and the setup categories the BIOS supplies. Use Arrow keys to move among the items and menus, and make changes to the settings.

PhoenixBIOS Setup Utility		
Main	System Summary	Advanced IPMI Security Boot Exit
System Time	[17:45:55]	Item Specific Help
System Date	[06/25/2004]	<Enter> selects field.
Legacy Diskette A:	[1.2MB 5¼ ]	
▸ Primary IDE Master	[CD-ROM]	
▸ Primary IDE Slave	[None]	
▸ Secondary IDE Master	[None]	
▸ Secondary IDE Slave	[None]	
▸ Serial ATA Channel 0 Master	[None]	
▸ Serial ATA Channel 1 Master	[None]	
Language:	[English (US)]	
F1 Help	↑↓ Select Item	-/+ Change Values F9 Setup Defaults
Esc Exit	↔ Select Menu	Enter Select Sub-Menu F10 Save and Exit

### Main

Use this menu for basic system configurations, such as time, date etc.

### System Summary

Use this menu to view system settings and CPU configurations.

### Advanced

Use this menu to set up the items of special enhanced features available on your system's chipset.

### IPMI (Optional)

This setup screen is for IPMI (Intelligent Platform Management Interface) configurations and appears **only when the MS-9569 BMC card (for Server Management) is installed on the mainboard.**

**Security**

Use this menu to set Supervisor and User Passwords.

**Boot**

Use this menu to specify the priority of boot devices.

**Exit**

This menu allows you to load the BIOS default values or factory default settings into the BIOS and exit the BIOS setup utility with or without changes.

## Main

The items inside the Main menu are for basic system information and configuration. Each item includes none, one or more setup items. Use the Up/Down arrow keys or <Tab> to highlight the item or field you want to modify and use the <+> or <-> key to switch to the value you prefer.

PhoenixBIOS Setup Utility		
Main	System Summary	Advanced IPMI Security Boot Exit
System Time	[17:45:55]	Item Specific Help
System Date	[06/25/2004]	<Enter> selects field.
Legacy Diskette A:	[1.2MB 5¼ ]	
▸ Primary IDE Master	[CD-ROM]	
▸ Primary IDE Slave	[None]	
▸ Secondary IDE Master	[None]	
▸ Secondary IDE Slave	[None]	
▸ Serial ATA Channel 0 Master	[None]	
▸ Serial ATA Channel 1 Master	[None]	
Language:	[English (US)]	

F1 Help	↑↓ Select Item	-/+ Change Values	F9 Setup Defaults
Esc Exit	↔ Select Menu	Enter Select Sub-Menu	F10 Save and Exit

### System Time

The time format is <HH> <MM> <SS>.

### System Date

The date format is <MM> <DD> <YYYY>.

### Legacy Diskette A:

This item allows you to set the type of floppy drive installed.

### Primary/Secondary IDE Master/Slave, Serial ATA Channel 0/1 Master

Press PgUp/<+> or PgDn/<-> to select [Manual], [None] or [Auto] type. Note that the specifications of your drive must match with the drive table. The hard disk will not work properly if you enter improper information for this category. If your hard disk drive type is not matched or listed, you can use [Manual] to define your own drive type manually.

If you select [Manual], related information is asked to be entered to the following items. Enter the information directly from the keyboard. This information should be provided in the documentation from your hard disk vendor or the system manufacturer.

[Type]	Select how to define the HDD parameters
[Multi-Sector Transfers]	Any selection except Disabled determines the number of sectors transferred per block
[LBA Mode Control]	Enabling LBA causes Logical Block Addressing to be used in place of Cylinders, Heads and Sectors.
[Transfer Mode]	Selects the method for transferring the data between the hard disk and system memory
[Ultra DMA Mode]	Indicates the type of Ultra DMA.

**Language**

Use this setting to set the display language of the BIOS utility.

## System Summary

The items inside the Main menu are for basic system information and configuration. Each item includes none, one or more setup items. Use the Up/Down arrow keys or <Tab> to highlight the item or field you want to modify and use the <+> or <-> key to switch to the value you prefer.

PhoenixBIOS Setup Utility						
Main	System Summary	Advanced	IPMI	Security	Boot	Exit
BIOS Version: 1.01  Processor Speed: 2.80GHz  Processor 1 CPU ID: 0F31 Processor 1 L2 Cache: 1024KB  Processor 2 CPU ID: Not Installed  DIMM Group #1 Status: Not Installed DIMM Group #2 Status: Not Installed DIMM Group #3 Status: Normal  System Memory: 624KB Extended Memory: 260608KB				Item Specific Help		
				<Enter> selects field.		
F1 Help	↑↓ Select Item	-/+ Change Values	F9 Setup Defaults			
Esc Exit	↔ Select Menu	Enter Select	Sub-Menu	F10 Save and Exit		

### BIOS Version

This setting shows the BIOS version.

### Processor Speed

It shows the processor speed.

### Processor 1/2 CPU ID

It shows the ID of the installed CPUs.

### Processor 1 L2 Cache

It shows the size of the L2 cache for CPU1.

### DIMM Group #1 Status/DIMM Group #2 Status/DIMM Group #3 Status

It shows the status of the DIMM group #1, 2, & 3.

### System Memory

It displays amount of conventional memory detected during boot-up.

### Extended Memory

It displays the amount of extended memory detected during boot-up.

## Advanced

Items in the menu are divided into several sub-menus. Each sub-menu provides more settings. To enter the sub-menu, highlight the sub-menu you want to configure and press <Enter>.

PhoenixBIOS Setup Utility						
Main	System Summary	Advanced	IPMI	Security	Boot	Exit
<div>Setup Warning</div> <div>Setting items on this menu to incorrect values may cause your system to malfunction.</div> <div><div>▸ Processor Settings</div><div>▸ Advanced Chipset Control</div><div>▸ PCI Configuration</div><div>▸ Peripheral Configuration</div><div>▸ Boot Features</div><div>▸ DMI Event Logging</div><div>▸ Console Redirection</div></div>			Item Specific Help			
F1 Help    ↑↓ Select Item    -/+ Change Values    F9 Setup Defaults Esc Exit    ↔ Select Menu    Enter Select Sub-Menu    F10 Save and Exit						

### Processor Settings

Press <Enter> to view the settings of the onboard CPU(s).

Processor Settings	
Hyper-Threading Technology:	[Enabled]

### Hyper-Threading Technology

The processor uses Hyper-Threading technology to increase transaction rates and reduces end-user response times. The technology treats the two cores inside the processor as two logical processors that can execute instructions simultaneously. In this way, the system performance is highly improved. If you disable the function, the processor will use only one core to execute the instructions. **Please disable this item if your operating system doesn't support HT Function, or unreliability and instability may occur.** Settings: [Enabled], [Disabled].



**MSI Reminds You...**

Enabling the functionality of Hyper-Threading Technology for your computer system requires ALL of the following platform components:

- \* **CPU:** An Intel® Pentium® 4 Processor with HT Technology;
- \* **Chipset:** An Intel® Chipset that supports HT Technology;
- \* **BIOS:** A BIOS that supports HT Technology and has it enabled;
- \* **OS:** An operating system that supports HT Technology.

For more information on Hyper-threading Technology, go to:  
[www.intel.com/info/hyperthreading](http://www.intel.com/info/hyperthreading)

**Advanced Chipset Control**

The sub-menu is used to configure chipset features for optimal system performance.

Advanced Chipset Control	
Enable Multimedia Timer:	[No]
USB Host Controller:	[Enabled]
Parallel ATA:	[Both]
Serial ATA:	[Enabled]
Native Mode Operation:	[Auto]
SATA RAID Enable:	[Disabled]
Wake On LAN/PME:	[Enabled]
Wake On Ring:	[Disabled]
Wake On RTC Alarm:	[Disabled]

**Enable Multimedia Timer**

This setting controls the multimedia timer.

**USB Host Controller**

This setting is used to enable/disable the onboard USB controller. Setting options: [Enabled], [Disabled].

**Parallel ATA**

The chipset contains a PCI IDE interface that supports two IDE channels: Primary (IRQ 14) and Secondary (IRQ 15). Each channel supports two IDE devices, so the system is capable of supporting a total of four IDE devices. Select [Primary], [Secondary], or [Both] to activate chipset IDE interface(s) installed on your system board.

### Serial ATA

This setting allows you to enable or disable the onchip Serial-ATA controller. Settings: [Enabled], [Disabled].

### Native Mode Operation

Certain OS does not support Native Mode. In this mode, system BIOS will search all available IRQs to use for HDD.

- \* New OS that supports switch to Native Mode (WinXP, Windows .NET Server) can set SATA and PATA to Native Mode.
- \* Maximum 6 ATA devices to connect (4 for P-ATA & 2 for S-ATA).

### SATA RAID Enable

This feature allows users to enable or disable the RAID function for each SATA hard disk drive. Options: [Enabled], [Disabled].

### Wake On LAN/PME

When setting to [Enabled], the feature allows your system to be awakened from the power saving modes through any signal from LAN or any event on PME (Power Management Event). Settings: [Enabled] and [Disabled].

### Wake On Ring

The setting specifies whether the system will be awakened from power saving modes when activity or input signal from the specified modem is detected. Options: [Enabled], [Disabled].



#### MSI Reminds You...

*You need to install a modem card supporting power on function for "Wake On Ring" function.*

### Wake On RTC Alarm

This is used to enable or disable the feature of booting up the system on a scheduled time/date from the S3, S4, and S5 state. Setting options: [Disabled], [Enabled].

### PCI Configuration

The sub-menu is used to configure the PCI interface.

PCI Configuration	
Reset Configuration Data:	[No]
▶ Embedded SCSI	
▶ Embedded NIC (Gbit)	
▶ Embedded Video Controller	

### Reset Configuration Data

Select [Yes] if you want to clear the Extended System Configuration Data (ESCD). Options: [Yes], [No].

**Embedded SCSI (Optional)**

The sub-menu is used to configure the onboard SCSI device.

**SCSI Controller (Optional)**

Use this feature to enable or disable the onboard SCSI controller.

**Option ROM Scan (Optional)**

Use this feature to initialize device expansion ROM.

**Embedded NIC (Gbit)**

The sub-menu is used to configure the onboard LAN device.

**LAN Controller**

Use this feature to enable or disable the onboard LAN controller(s).

**Option ROM Scan**

Use this feature to initialize device expansion ROM.

**Embedded Video Controller**

The sub-menu is used to configure the onboard video device.

**Onboard VGA Control**

Use this feature to enable or disable the onboard VGA controller.

**Peripheral Configuration**

The sub-menu is used to configure I/O devices for optimal system performance.

Peripheral Configuration	
Serial port A :	[Enabled]
Base I/O address :	[3F8]
Interrupt :	[IRQ 4]
Serial port B :	[Enabled]
Mode :	[Normal]
Base I/O address :	[2F8]
Interrupt :	[IRQ 3]
PS/2 Mouse :	[Auto Detect]
Legacy USB Support:	[Enabled]

**Serial port A/B**

Setting to [Enabled] allows users to configure the base I/O address and IRQ of Port A/Port B manually. Selecting [Auto] allows BIOS to automatically determine the correct base I/O port address. Options: [Enabled], [Disabled], [Auto].

**Base I/O address**

It specifies the base I/O address for Port A/Port B. Options: [3F8], [2F8], [3E8], [2E8].

**Interrupt**

It specifies the interrupt for Port A/Port B. Options: [IRQ 3], [IRQ 4].

**PS/2 Mouse**

If your system has a PS/2 mouse port and you install a serial pointing device, select [Disabled].

**Legacy USB Support**

Set to [Enabled] if you need to use any USB 1.1/2.0 device in the operating system that does not support or have any USB 1.1/2.0 driver installed, such as DOS and SCO Unix. Set to [Disabled] only if you want to use any USB device other than the USB mouse. Setting options: [Enabled], [Disabled].

**Boot Features**

The sub-menu controls system boot features.

Boot Features	
Summary Screen:	[Enabled]
Boot-time Diagnostic Screen:	[Enabled]
QuickBoot Mode:	[Disabled]
NumLock:	[Auto]
Post Error Pause:	[Enabled]

**Summary Screen**

Selecting [Enabled] displays system summary screen during boot up. Options: [Enabled], [Disabled].

**Boot-time Diagnostic Screen**

Select [Enabled] if you want to view the system diagnostic screen during boot-time. Options: [Enabled], [Disabled].

**QuickBoot Mode**

Setting the item to [Enabled] allows the system to boot within 5 seconds since it will skip some check items. Available options: [Enabled], [Disabled].

**NumLock**

[On] or [Off] turns NumLock on or off at boot up. [Auto] turns NumLock on if it finds a numeric key pad. Options: [On], [Off], [Auto].

**POST Error Pause**

When set to [Enabled], the system will wait for user intervention on critical POST errors. When set to [Disabled], the system will boot with no intervention if possible. Options: [Enabled], [Disabled].

**DMI Event Logging**

Press PgUp/<+> or PgDn/<-> to view DMI event logging.

DMI Event Logging	
Event Log Validity:	Valid
Event Log Capacity:	Space Available
View DMI Event Log:	[Enter]
Event Logging:	[Enabled]
ECC Event Logging:	[Enabled]
Mark DMI Events as Read:	[Enter]
Clear All DMI Event Logs:	[No]

**View DMI Event Log**

Press [Enter] to view the contents of the DMI event log.

**Event Logging**

This setting disables/enables the BIOS to log DMI (Desktop Management Interface) events. Setting options: [Disabled], [Enabled].

**ECC Event Logging**

This setting disables/enables the BIOS to log ECC (Error Checking & Correcting) events. Setting options: [Disabled], [Enabled].

**Mark DMI Events as Read**

Press [Enter] and a screen pops up, asking users to confirm whether or not to clear all DMI event logs immediately. Press [Y] and [Enter], the BIOS will clear all DMI event logs right away.

**Clear All DMI Event Logs**

When this setting is set to [Yes], the DMI event log will be cleared at next POST stage. Then, the BIOS will automatically set this option to [No]. Setting options: [Yes], [No].

**Console Redirection**

Press PgUp/<+> or PgDn/<-> to configure Console Redirection.

Console Redirection	
BIOS Redirection Port:	[Disabled]
Baud Rate:	[19.2K]
Flow Control:	[CTS/RTS]
Console Type:	[PC ANSI]
FIFO Level:	[Level 14]
Console Connection:	[Direct]
Continue C.R. after POST:	[On]
# of Video Pages to Support:	[1]

**BIOS Redirection Port**

This feature selects the serial port to use for Console Redirection. [Disabled] completely disables Console Redirection. Setting options: [Disabled], [Serial Port A].

**Baud Rate**

It allows you to select delay before key repeat. Options: [300], [1200], [2400], [9600], [19.2K], [38.4K], [57.6K], [115.2K].

**Flow Control**

The Flow Control has to be enabled when EMP is sharing the same serial port as Console Redirection. The Flow Control must be set to [CTS/RTS] or [CTS/RTS+CD] depending on whether a modem is used. Options: [None], [XON/XOFF], [CTS/RTS].

**Console Type**

This feature allows you to enable the specified console type. Options: [VT100], [VT100, 8bit], [PC-ANSI, 7bit], [PC ANSI], [UT100+], [VT-UTF8].

**FIFO Level**

This feature allows you to enable the specified FIFO level. Options: [Level 4], [Level 14].

**Console Connection**

This feature indicates whether the console is connected directly to the system or a modem is used for connection. Options: [Direct], [Via modem].

**Continue C. R. after POST**

Selecting [On] will enable Console Redirection after OS has loaded. Options: [On], [Off].

**# of Video Pages to Support**

This setting controls the number of video pages to allocate for Console Redirection when video hardware is not available.

## IPMI (Optional)

This setup screen appears **only when the MS-9569 BMC card (for Server Management) is installed on the mainboard**. Press PgUp/<+> or PgDn/<-> to configure IPMI.

PhoenixBIOS Setup Utility						
Main	System Summary	Advanced	IPMI	Security	Boot	Exit
IPMI Specification Version: 1.5 BMC Device ID: 00 BMC Device Version: 03 BMC Firmware Version: 00.03 Platform Event Filtering: [Enabled] Change COM Port Setting: [No] COM Port On BMC: [Disabled] System Event Logging: [Enabled] Clear System Event Log: [Disabled] Existing Event Log Number: 255 Remaining Event Log Number: 0 Event Log Control SYS Firmware Progress: [Disabled] BIOS POST Errors: [Enabled] BIOS POST Watchdog: [Disabled] OS Boot Watchdog: [Disabled] Timer for Loading OS: [10] Time Out Action: [No Action] ▶ System Event Log				Item Specific Help  Disables/Enables triggers for system sensor events inside BMC (Baseboard Management Controller)		
F1 Help	↑↓ Select Item		-/+ Change Values	F9 Setup Defaults		
Esc Exit	↔ Select Menu		Enter Select Sub-Menu	F10 Save and Exit		

### IPMI Specification Version

It shows the support version of IPMI specification. (read only)

### BMC Device ID

It shows the ID of the BMC device. (read only)

### BMC Device Version

It shows the support version of the BMC device. (read only)

### BMC Firmware Version

It shows the current BMC firmware version. (read only)

### Platform Event Filtering

Setting to [Enabled] triggers the system event sensors inside BMC (Baseboard Management Controller).

**Change COM Port Setting**

This setting controls the COM port setting.

**COM Port on BMC**

This setting disables/enables the COM port on BMC.

**System Event Logging**

This setting disables/enables the logging of system events.

**Clear System Event Log**

Enabling this selection will force the BIOS to clear the System Event Log on the next boot. Options: [Disabled], [Enabled].

**Existing Event Log Number**

It shows the number of existing event logs.

**Remaining Event Log Number**

It shows the number of remaining event logs.

**SYS Firmware Progress**

Enabling this selection will log system POST progress. Options: [Enabled], [Disabled].

**BIOS POST Errors**

Enabling this selection will log BIOS POST errors. Options: [Enabled], [Disabled].

**BIOS POST Watchdog**

You can enable the system watch-dog timer, a hardware timer that generates either an NMI or a reset when the software that it monitors does not respond as expected each time the watch dog polls it (select the time period in a separate field). Enabling this selection will enable BIOS POST watchdog. Options: [Enabled], [Disabled].

**OS Boot Watchdog**

You can enable the system watch-dog timer, a hardware timer that generates either an NMI or a reset when the software that it monitors does not respond as expected each time the watch dog polls it (select the time period in a separate field). Enabling this selection will enable OS boot watchdog. Options: [Enabled], [Disabled].

**Timer for Loading OS**

This setting selects the watchdog time period for loading OS.

**Time Out Action**

This setting determines the action of the watchdog timer if the OS fails to boot within the preset time period.



**System Event Log**

Press <Enter> to display the System Event Log.

System Event Log	
SEL Entry Number =	1
SEL Record ID =	0010
SEL Record Type =	02 - System Event Record
Timestamp =	01.13.2004 10:50:08
Generator Id =	20 00
SEL Message Rev =	04
Sensor Type =	01 - Temperature
	--
Sensor Number =	32 - TMP_S2
SEL Event Type =	81 - Upper Non-critical Going
SEL Event Data =	57 24 2A

# Security

This section lets you set security passwords to control access to the system at boot time and/or when entering the BIOS setup program. It also allows you to set virus protection at hard disk boot sector.

PhoenixBIOS Setup Utility		
Main	System Summary	Advanced IPMI Security Boot Exit
<div>Supervisor Password Is : Clear</div> <div>User Password Is : Clear</div> <div>Set Supervisor Password : [Enter]</div> <div>Set User Password : [Enter]</div> <div>Password on boot : [Disabled]</div> <div>Fixed disk boot sector : [Normal]</div>		<div>Item Specific Help</div>
<div>F1 Help    ↑↓ Select Item    -/+ Change Values    F9 Setup Defaults</div> <div>Esc Exit    ↔ Select Menu    Enter Select Sub-Menu    F10 Save and Exit</div>		

## Supervisor Password Is/User Password Is

It shows the preset supervisor/user password. (read only)

## Set Supervisor Password/Set User Password

Enabling **Supervisor Password** requires a password for entering Setup. The passwords are not case sensitive. Pressing <Enter> at either **Set Supervisor Password** or **Set User Password** displays the following message:

Set Supervisor Password	
Enter New Password:	[    ]
Confirm New Password:	[    ]

Type the password and press <Enter>. Repeat.

**Password on boot**

Choosing [Enabled] requires a password on boot. It requires prior setting of the supervisor password. If the supervisor password is set and this option is disabled, BIOS assumes the user is booting. Options: [Enabled], [Disabled].

**Fixed disk boot sector**

Write protects the boot sector on the hard disk for virus protection. It requires a password to format the hard disk. Options: [Normal], [Write Protect].

# Boot

Use this menu to arrange and specify the priority of the devices from which the BIOS will attempt to boot the Operating System.

PhoenixBIOS Setup Utility

MainSystem SummaryAdvancedIPMISecurityBootExit

CD-ROM Drive  
+Removable Devices  
+Hard Drive  
IBA GE Slot 0208 v1217  
IBA GE Slot 0209 v1217

Item Specific Help

F1 Help    ↑↓ Select Item    -/+ Change Values    F9 Setup Defaults  
Esc Exit    ↔ Select Menu    Enter Select Sub-Menu    F10 Save and Exit

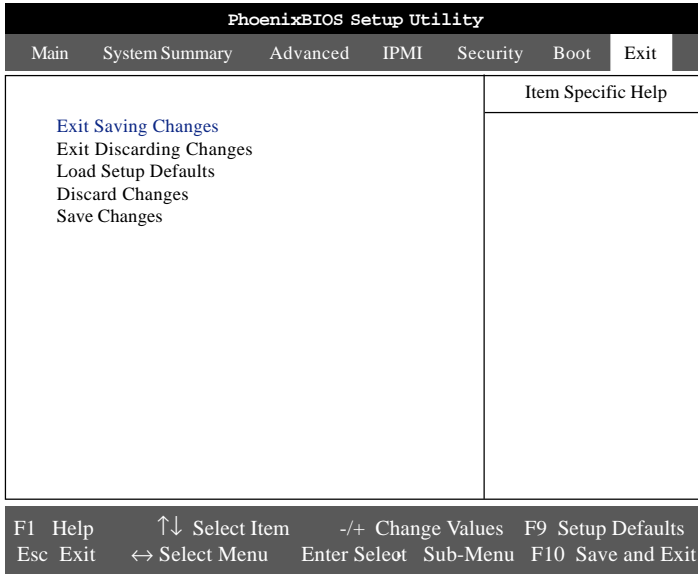
## CD-ROM Drive, Removable Devices, Hard Drive

These are the generic types of devices on your system from which you can boot an operating system. You may have more than one device of each type. If so, the generic type is marked with a plus or minus sign. Use the <Enter> key to expand or collapse the devices marked with <+> or <->. Press <Ctrl+Enter> to expand all such devices.

To change a device's priority, first select it with the up-or-down arrows, and move it up or down using the <+> and <-> keys.

## Exit

The following sections describe each of the options on this menu. Note that <Esc> does not exit this menu. You must select one of the items from the menu or menu bar to exit.



### Exit Saving Changes

When you want to quit the Setup menu, you can select this option to save the changes and quit.

### Exit Discarding Changes

When you want to quit the Setup menu, you can select this option to abandon the changes.

### Load Setup Defaults

The option allows users to restore all of the BIOS settings to the Optimal Defaults. The Setup Defaults are the default values set by the mainboard manufacturer specifically for the optimized performance of the mainboard.

### Discard Changes

The option allows users to restore all of the BIOS settings to previous values.

### Save Changes

The option allows users to save the changes without exiting Setup.

## ***Appendix A: SCSI BIOS Setup (Optional)***

This chapter provides information on the Small Computer System Interface (SCSI) BIOS setup utility and allows you to configure the SCSI subsystem for optimum use.

You may need to run the SCSI BIOS setup utility when:

- ◆ You want to change the default SCSI controller settings for customized features.
- ◆ You intend to manage any of the attached SCSI devices.

## Entering SCSI BIOS

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <Ctrl> + <A> keys simultaneously to enter SCSI BIOS utility.

◀◀◀ Press <Ctrl><A> for SCSISelect(TM) Utility ▶▶▶

### Control Keys

Use the following keys to navigate the SCSI BIOS menu items.

<↑> <↓> <←> <→>	Move between different items
<Enter>	Select the item or show the options of the selected item
<Esc>	Exit the menu or return to the main menu from a submenu
<F6>	Restore the default SCSI values

### Selecting the SCSI Channel

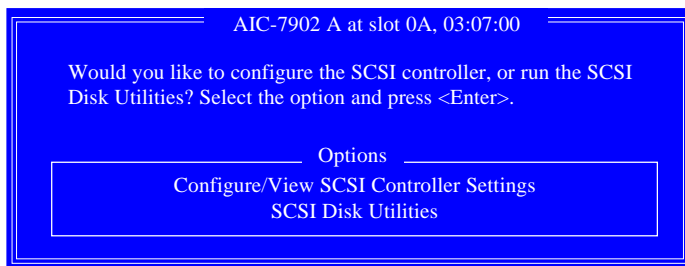
After entering the SCSI BIOS by pressing the <Ctrl> + <A> key combination, you will see the following menu appear on the screen.

AIC-7902 A at slot 0A 03:07:00  
AIC-7902 B at slot 0A 03:07:01

Each item represents one SCSI channel (connector). The mainboard offers dual onboard SCSI channels: channel A & channel B. Move the cursor to the desired channel and then press <Enter>.

### Selecting the Management Type

The following screen will appear after you select the SCSI channel you intend to manage. The menu will list two categories for you to choose what to do with the SCSI channel. Move the cursor to the desired function and press <Enter>.



**Configure/View SCSI Controller Settings**

Use this option for SCSI controller configurations.

**SCSI Disk Utilities**

Use this option to manage the attached SCSI device.



## Configure/View SCSI Controller Settings

There are 8 items in the "Configure/View SCSI Controller Settings" screen. These items display or allow you to change the SCSI controller's settings. Use the arrow keys to highlight the item and then press <Enter> to select the value you want in each item or enter each item's sub-menu screen.

```
AIC-7902 A at slot 0D, 03:07:00

Options
-----
SCSI Bus Interface Definitions
SCSI Controller ID ..... 7
SCSI Controller Parity ..... Enabled
SCSI Controller Termination ..... Enabled

Additional Options
Boot Device Configuration ..... Press <Enter>
SCSI Device Configuration ..... Press <Enter>
Advanced Configuration ..... Press <Enter>

<F6> -- Reset to SCSI Controller Defaults

BIOS Information
-----
Interrupt (IRQ) Channel ..... 11
I/O Port Address ..... B000h, B400h
```

### SCSI Bus Interface Definitions

#### SCSI Controller ID

The item is used to assign a SCSI ID to the SCSI controller. It is recommended that you should leave the default setting unchanged. Settings: [0]~[15].

#### SCSI Controller Parity

Use the field to enable or disable SCSI parity error checking function. If any of your SCSI devices does not support parity checking, disable this function. While disabling the function, you should disable disconnections for all devices, as parity checking for the reselection phase is NOT disabled. A non-parity device's I/O operation will never complete if the reselection fails due to a parity error.

#### SCSI Controller Termination

In order to have the SCSI bus function properly and reliably, termination at the ends of

the SCSI bus is necessary. Proper termination can ensure signal on the SCSI bus will not reflect and cause data loss or errors. Settings options: [Enabled], [Disabled].

## **Additional Options**

### **Boot Device Configuration**

Press <Enter> to enter the sub-menu screen.

Boot Device Configuration	
Single Image	
Master SCSI Controller .....	AIC-7902 A at slot 0A 03:07:00
Select SCSI peripheral from which to boot	
Boot SCSI Controller .....	AIC-7902 A at slot 0A 03:07:00
Boot SCSI ID .....	0
Option Listed Below Has NO EFFECT if MULTI LUN Support is Disabled	
Boot LUN Number .....	0

### **Boot SCSI Controllers**

Select either SCSI channel A (AIC-7902 A) or channel B (AIC-7902 B) to boot up the SCSI subsystem.

### **Boot SCSI ID**

Specify a SCSI device to become the boot device by selecting its SCSI ID. Setting options: [0]~[15].

### **Boot LUN Number**

If a boot device has multiple logical units, you must specify the boot logical unit number (LUN). If multiple LUN support is disabled, specifying a number here is useless. Setting options: [0]~[7].

### **SCSI Device Configuration**

Press <Enter> and the following sub-menu screen appears. The sub-menu screen allows you to specify the configuration for each device on the SCSI bus.

SCSI Device Configuration								
SCSI Device ID	#0	#1	#2	#3	#4	#5	#6	#7
Sync Transfer Rate (MB/Sec) .....	320	320	320	320	320	320	320	320
Packetized.....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
QAS.....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initiate Wide Negotiation .....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enable Disconnection .....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Send Start Unit Command .....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BIOS Multiple LUN Support .....	No	No	No	No	No	No	No	No
Include in BIOS Scan .....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SCSI Device ID	#8	#9	#10	#11	#12	#13	#14	#15
Sync Transfer Rate (MB/Sec) .....	320	320	320	320	320	320	320	320
Packetized.....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
QAS.....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initiate Wide Negotiation .....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enable Disconnection .....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Send Start Unit Command .....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BIOS Multiple LUN Support .....	No	No	No	No	No	No	No	No
Include in BIOS Scan .....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

### Sync Transfer Rate (MB/Sec)

The field allows you to specify the maximum synchronous data transfer rate depending on the type of each SCSI device. Select [ASYN] to enable asynchronous negotiation for some older SCSI devices.

### Packetized

When enabled, this option is supported by the device drivers. However, this option is not supported by the BIOS.

### QAS

When enabled, this option is supported by the device drivers. However, this option is not supported by the BIOS.

### Initiate Wide Negotiation

When set to [Yes], the field allows wide SCSI hard drives to use 16-bit (2 bytes) transfers.

### Enable Disconnection

This field tells the SCSI controller whether or not to allow the specified SCSI device to disconnect during an I/O transfer operation. The disconnection ability frees the SCSI bus to allow other I/O processes and thus optimizes the SCSI bus performance. Setting options: [Yes], [No].

**Send Start Unit Command**

When set to **Yes**, the SCSI controller sends the Start Unit command to the specified SCSI device during bootup. The interface powers up the SCSI device on-at-a-time during bootup, reducing the load on the computer's power supply. Setting options: [Yes], [No].

**BIOS Multiple LUN Support**

Select [Yes] when any SCSI device has multiple logical units. Setting options: [Yes], [No].

**Include in BIOS Scan**

Selecting [Yes] allows the SCSI controller to control the SCSI device with its SCSI ID. When set to [No], the SCSI controller does not control the specified SCSI device by not scanning for the SCSI ID during bootup, but the boot time will be decreased. Setting options: [Yes], [No].

**Advanced Configuration**

Press <Enter> to enter the sub-menu screen for advanced configuration.

Advanced Configuration	
Reset SCSI Bus at IC Initialization .....	Enabled
Display <Ctrl><A> Message During BIOS Initialization .....	Enabled
Extended Int 13 Translation for DOS Drives > 1 GByte .....	Enabled
POST Display Mode .....	Verbose
SCSI Controller Int 13 Support .....	Enabled
Option Listed Below Has NO EFFECT if MULTI LUN Support is Disabled	
Domain Validation .....	Enabled
Support Removable Disks Under Int 13 as Fixed Disks .....	Disabled
BIOS Support for Bootable CD-ROM.....	Enabled

**Reset SCSI Bus at IC Initialization**

Selecting [Enabled] will reset the SCSI bus the first time the SCSI controller is initialized. Setting options: [Enabled], [Disabled].

**Display <Ctrl><A> Message During BIOS Initialization**

When enabled, the message "Press <Ctrl><A> for SCSISelect(TM) Utility" appears on the screen during bootup. If disabled, the message does not show up, but you can still press <Ctrl> + <A> key combination to enter the SCSI BIOS utility. Setting options: [Enabled], [Disabled].

**Extended Int 13 Translation for DOS Drives > 1 GByte**

The field allows SCSI hard disk drives greater than 1 GB to use a translation scheme of 255 heads, 63 sectors per track. Setting options: [Enabled], [Disabled].

**POST Display Mode**

The field determines how much information about your SCSI controller and devices appear on the screen during bootup. For the most complete information, choose [Diagnostic]. For a faster boot, select [Silent]. Setting options: [Verbose], [Silent], [Diagnostic].

**SCSI Controller Int 13 Support**

The field allows you to enable or disable the support for Int 13h. The software interrupt "Int 13h" is the interface through which the operating system or application is able to pass commands to hard disk drives, such as reading, writing and formatting. Setting options: [Enabled], [Disabled: NOT scan], [Disabled: scan bus].

**Domain Validation**

When enabled, these options are available if they are implemented in the device drivers. However, this option is not supported by the BIOS.

**Support Removable Disks Under Int13 as Fixed Disks**

When [Boot Only] is selected, only the removable media drive designated as the boot device will be treated as a hard disk drive. When [All Disks] is selected, all removable media drives supported by the BIOS are treated as hard disk drives. If selecting [Disabled], no removable media drive is treated as a hard disk drive and the removable media drives must be controlled by the OS drivers.

**BIOS Support for Bootable CD-ROM**

When enabled, the SCSI controller BIOS supports bootable CD-ROM under the El Torito specification. If booting from a hard disk or other device, make sure no bootable CD-ROM is inserted or disable this option.

## **BIOS Information**

**Interrupt (IRQ) Channel**

Displays the IRQ line assigned to the SCSI channel.

**I/O Port Address**

Displays the I/O port address assigned to the SCSI channel.

## Disk Utilities

AIC-7902 A at slot 0A, 03:07:00

Select SCSI Disk and press <Enter>

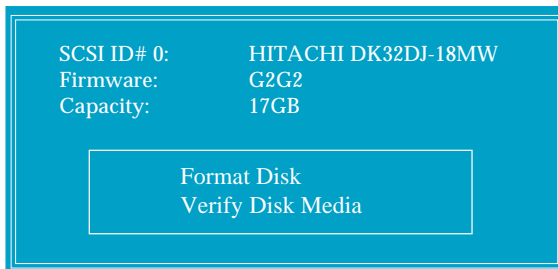
SCSI ID#0:	No device
SCSI ID#1:	No device
SCSI ID#2:	No device
SCSI ID#3:	No device
SCSI ID#4:	No device
SCSI ID#5:	No device
SCSI ID#6:	No device
SCSI ID#7:	Adaptec AIC-7902
SCSI ID#8:	No device
SCSI ID#9:	No device
SCSI ID#10:	No device
SCSI ID#11:	No device
SCSI ID#12:	No device
SCSI ID#13:	No device
SCSI ID#14:	No device
SCSI ID#15:	No device

AIC-7902 B at slot 0A, 03:07:00

Select SCSI Disk and press <Enter>

SCSI ID#0:	HITACHI DK32DJ-18MW
SCSI ID#1:	No device
SCSI ID#2:	No device
SCSI ID#3:	No device
SCSI ID#4:	No device
SCSI ID#5:	No device
SCSI ID#6:	No device
SCSI ID#7:	Adaptec AIC-7902
SCSI ID#8:	No device
SCSI ID#9:	No device
SCSI ID#10:	No device
SCSI ID#11:	No device
SCSI ID#12:	No device
SCSI ID#13:	No device
SCSI ID#14:	No device
SCSI ID#15:	No device

Select the SCSI device which you want to manage by highlighting the item and press <Enter>. The following dialog box appears. Select the function you want to perform.



SCSI ID# 0:	HITACHI DK32DJ-18MW
Firmware:	G2G2
Capacity:	17GB

Format Disk  
Verify Disk Media

**Format Disk**

The utility performs low-level formatting of a hard disk drive. The function might take several hours to complete.

**Verify Disk Media**

This utility verifies that the drive is functioning properly. Verifying function will scan for media defects on the disk.

## ***Appendix B: Adaptec SATA RAID Utility for Intel ICH5R (Optional)***

The southbridge ICH5R provides a hybrid solution that combines two independent SATA ports for support of up to two Serial ATA (Serial ATA RAID) drives and utilizes Adaptec Embedded Serial ATA RAID Software to support RAID levels 0 and 1 for easy management of the storage subsystems.

Serial ATA (SATA) is the latest generation of the ATA interface. SATA hard drives deliver blistering transfer speeds of up to 150MB/sec. Serial ATA uses long, thin cables, making it easier to connect your drive and improving the airflow inside your PC.

1. Supports 150 MB/s transfers with CRC error checking
2. Data handling optimizations including tagged command queuing, elevator seek and packet chain command



### **MSI Reminds You...**

*All the information/volumes listed in your system might differ from the illustrations in this appendix.*



## Introduction

### 1. Overview

Adaptec Embedded Serial ATA RAID with HostRAID™ adds RAID functionality to the Serial ATA I/O controller by supporting RAID levels 0 and 1. HostRAID adds entry level RAID support to the Serial ATA I/O controller. With HostRAID, you can add reliable performance and full data protection.

### 2. Operating System Compatibility

- ◆ Microsoft® Windows® 2000, Windows® Server 2003, and Windows® XP
- ◆ Linux
  - Red Hat 7.3 and 8.0
  - SuSE 8.0 and 8.1

### 3. Storage Requirements

Device drivers and storage management software require approximately 20 MB of disk space.

### 4. Features

Adaptec Embedded Serial ATA RAID Software RAID supports:

- ◆ RAID levels 0, 1, and simple volume using Adaptec's HostRAID technology.
- ◆ Operating system independent configuration and RAID creation using Adaptec RAID Configuration (ARC).
- ◆ Easy array configuration and status using Adaptec Storage Manager™ – Browser Edition.  
Install Adaptec Storage Manager – Browser Edition as described in *Installing Adaptec Storage Manager – Browser Edition*.
- ◆ Event logging and broadcasting, including messaging for alphanumeric pagers.

### 5. Storage Management Software Overview

Adaptec Embedded Serial ATA RAID includes the following software tools to manage your storage subsystem:

- ◆ **Adaptec Storage Manager – Browser Edition**—Browser-based storage management software that provides all of the creation, management, and data logging needed to manage arrays.  
Arrays may be set up and managed on systems using the following operating systems:
  - Windows 2000, Windows Server 2003, and Windows XP
  - Red Hat Linux 7.3 and 8.0
  - SuSE Linux 8.0 and 8.1

- ◆ **Adaptec RAID Configuration (ARC) Utility**—Part of the controller's built-in BIOS code. You start ARC by pressing Ctrl+A during BIOS startup. For details, see *Adaptec RAID Configuration Utility*.
- ◆ **Array Configuration Utility (ACU)**—A DOS/BIOS application used to create, configure, and manage arrays. For details, see *Adaptec RAID Configuration Utility*.

## Installing the Driver

This section describes installing the driver and setting up the new array for the drives attached to your controller. Before you get started, you need to select from the following scenarios for installing the controller driver on Windows or Linux systems:

*Installing the Driver in a New Windows System*

*Installing the Driver in an Existing Windows System*

*Installing Red Hat Linux 7.3 or 8.0*

*Installing SuSE Linux 8.0 or 8.1*

### 1. Installing the Driver in a New Windows System

In this scenario, you are installing the driver in a new system that has no operating system. To install the driver:

1. Create a driver disk by following the instructions from the Web site or the product CD.
2. Restart the computer.
3. If creating an array, press **Ctrl-A** when prompted to enter the ARC utility. For instructions on creating an array from the BIOS, see *Adaptec RAID Configuration Utility*. For a simple volume, skip to Step 4.
4. When the array is finished building or if you are continuing from Step 3, insert the Windows setup CD and restart the system.
5. Press **F6** when prompted to install a third-party driver.



#### **MSI Reminds You...**

*When F6 is active, a prompt appears at the bottom of the screen. Press **F6** immediately — you only have 5 seconds. If you miss your chance, restart this Windows installation to complete it correctly. Otherwise, Windows will not recognize your controller.*

6. Insert the driver disk you created in Step 1 and wait until prompted to install a driver.
7. Press **S** to specify that the driver is on the floppy disk, and press **Enter**. Windows searches the disk for a suitable driver.
8. When the Adaptec Embedded Serial ATA HostRAID driver is found, press **Enter**. Follow the remaining on-screen instructions to complete your installation.

## 2. Installing the Driver in an Existing Windows System

In this scenario, you are installing a driver in a system that already has a Windows operating system. To install the driver:

1. Create a driver disk by following the instructions from the Web site or the product CD.
2. Start Windows. Windows launches the Found New Hardware Wizard, which searches for the controller driver.
3. Insert the driver disk you created in Step 1. Select the floppy disk drive as the source and click **Next**.
4. If necessary, select the appropriate driver for your operating system.
5. Click **Next** as needed to complete the controller installation.
6. Remove the driver disk.
7. If prompted, restart the computer.
8. Your installation is complete. If you want to create an array from the BIOS, see *Adaptec RAID Configuration Utility*. If you want to create an array from the operating system, see *Using Adaptec Storage Manager – Browser Edition*.

## 3. Installing Red Hat Linux 7.3 or 8.0

### ◆ Installing the Red Hat Driver in a New Linux System

In this scenario, you are installing the driver in a new Linux system. To install the driver:

1. Obtain a driver disk from either the Web site or the product CD.
2. Restart the computer.
3. If creating an array, press **Ctrl-A** when prompted to enter the ARC utility. For instructions on creating an array from the BIOS, see *Adaptec RAID Configuration Utility*. For a simple volume, skip to Step 4.
4. When the array is finished building, or if you are continuing from Step 3, insert the Red Hat CD Disk 1 in the CD-ROM drive and restart the system.
5. When the Red Hat Welcome screen appears, type **expert** or **linux dd** at the boot prompt.
6. When prompted, insert the driver disk (see Step 1) and select **OK**.
7. Follow the prompts to set up your preferred environment.
8. If you intend to install other third-party devices, proceed with the installation of those devices. Otherwise, select **Done**.
9. Continue with the Linux installation according to the Red Hat documentation.

### ◆ Installing or Updating the Driver in an Existing Linux System

To install the driver in an existing Linux system, type:

```
rpm -Uvh xxx.yyy.rpm
```

To update the driver in an existing Linux system, type:

```
rpm -Uvh —force xxx.yyy.rpm
```

where **xxx** is the name of the driver file and **yyy** is the processor type.

## 4. Installing SuSE Linux 8.0 or 8.1

### ◆ Installing the Driver in a New Linux System

In this scenario, you are installing the driver in a new Linux system. To install the driver:

1. Obtain a driver disk from either the Web site or the product CD.
2. Restart the computer.
3. If creating an array, press **Ctrl-A** when prompted to enter the ARC utility. For instructions on creating an array from the BIOS, see *Adaptec RAID Configuration Utility*. For a simple volume, skip to Step 4.
4. When the array is finished building, or if you are continuing from Step 3, insert the SuSE CD Disk 1 in the CD-ROM drive and restart the system.
5. When the SuSE Installation menu appears, press the **Alt** key, then select one option from the Menu and press **Enter**.
6. When prompted, insert the driver disk you created (see Step 1) and press any key to continue.
7. Follow the prompts to set up your preferred environment.
8. Continue with the Linux installation according to the SuSE documentation.
9. When the SuSE Menu appears:
  - For SuSE 8.0 — type **acpi=off** at the boot options, then press **Enter**.
  - For SuSE 8.1 — type **noapic** at the boot options, then press **Enter**.
10. When the Linux installation is complete:
  - For SuSE 8.0 — edit the */etc/lilo.conf* file by removing:  
**append="acpimp=force"**  
Run the */sbin/lilo* command to update the LILO.
  - For SuSE 8.1 — go to the *scrip* file by typing:  
**edit/boot/grub/menu.lst**  
Type **noapic** after **vga=xxx** as in this example: **Kernel(hd0,0)/vmlinuz root=/dev/hdc3 vga=791 noapic**

### ◆ Installing or Updating the Driver in an Existing Linux System

To install the driver in an existing Linux system, type:

***rpm -Uvh xxx.yyy.rpm***

To update the driver in an existing Linux system, type:

***rpm -Uvh —force xxx.yyy.rpm***

where **xxx** is the name of the driver file and **yyy** is the processor type.

## Installing Adaptec Storage Manager – Browser Edition

### 1. Overview

This chapter discusses the installation procedure for installing Adaptec Storage Manager – Browser Edition to enable remote and local management of arrays.

### 2. Supported Browsers

To run Adaptec Storage Manager – Browser Edition, your computer must have a Web browser supporting JavaScript and cookies only. The following versions are supported:

- ◆ On Windows
  - Internet Explorer (IE) 5.0 or later
  - Netscape 7 or later
- ◆ On Linux
  - Adaptec-supplied and installed version of Mozilla
  - Netscape 7 or later

When using Adaptec Storage Manager, you need to log on to your system with administrator privileges.

### 3. Typical, Custom, and Compact Installations

You can select from these setup options:

- ◆ **Typical** (default) — Supports local and remote management; however, Adaptec SNMP is not included.
- ◆ **Custom** — For expert users. Primarily used on Web servers or when you want to make sure SNMP and Notifier are available for a managed system. You can select from these components:
  - \* **Managed System Components** — If you choose this selection only, the installation is the same as a *Compact* installation.
  - \* **Adaptec Web Server** — Installs components allowing managed systems to communicate with Web browsers.
  - \* **Adaptec Storage Manager Notifier** — Installs messaging, including email and broadcaster capabilities.
  - \* **Adaptec SNMP** — Installs components used by SNMP-based applications. Requires Microsoft SNMP agents to be installed to function. Not included in a *Typical* installation.
- ◆ **Compact** — Installs only the components required on a remotely managed system. See Managed System Components, above.



#### **MSI Reminds You...**

*When you perform a Typical or Compact installation, components needed for communication and remote management are installed automatically.*

## **4. Installing Adaptec Storage Manager on Windows**



### **MSI Reminds You...**

*When installing on a FAT 32 file system, the folder being installed is automatically hidden.*

To install Adaptec Storage Manager – Browser Edition:

1. Verify that a supported browser is installed. See *Supported Browsers* for details.
2. Insert the product installation CD and wait for the Autorun executable to start the installation. If this does not occur, browse the CD and click **Autorun**.
3. Click **Adaptec Utilities**.
4. Click **Install Adaptec Storage Manager**.
5. Click **Next** in the Install Shield window.
6. Read the license agreement. If you agree to its terms, click **Yes**. If not, click **No** and terminate the installation. The Select a Setup Type window appears. It provides three types of installations: *Typical*, *Compact*, and *Custom*. See *Typical*, *Custom*, and *Compact Installations* for details.
7. Choose a setup type and click **Next**.
8. When you see the Destination Folder, click **Next**.
9. When you see the Setup Information, click **Next**. The Setup Status window shows progress using a scroll bar. Before the scroll bar shows the installation is completed, another window pops up indicating that a security certificate has been generated.
10. Click **OK**. The Root Certificate Store window appears.
11. Click **Yes**. The security certificate generated during installation is added to the Certificate Store. If you click **No** at this point, you will need to install the certificate the first time you run Adaptec Storage Manager.
12. When prompted to restart your computer, accept the default (Yes) and click **Finish**.
13. The system restarts to complete the installation.
14. Remove the product installation CD before the system restarts; otherwise, the installation will start again.

◆ **Configuring Internet Browsers on Windows**

If you are managing a local storage array and your computer uses a proxy server, you need to configure your browser to enable Adaptec Storage Manager to bypass the proxy server. Also, if you are managing remote systems, you need to configure Adaptec Storage Manager to bypass the proxy server when communicating with these systems.

The following procedures are described in this section:

*Configuring Internet Explorer for Local Management*

*Configuring Internet Explorer for Remote Management*

*Configuring Netscape Navigator for Local Management*

*Configuring Netscape Navigator for Remote Management*

Configuring Internet Explorer for Local Management

When using the *High* security setting, you must enable the following settings manually:

- JavaScript
- Cookies (not stored)

You *do not* need to enable the following custom level security settings for the local Intranet in Internet Explorer 5 and 5.5. Select **Tools > Internet Options** to access these settings:

- Active Scripting
- Allow per session cookies (not stored)



**MSI Reminds You...**

*In Internet Explorer 6.0 there is no security setting for cookies. Cookie configuration was removed from the Privacy tab. There is no setting for blocking Intranet cookies.*

If you are using a proxy server to access the Internet, you must bypass the proxy server to access the Adaptec Storage Manager Web server. To verify whether you are using a proxy server:

1. From the Internet Option window, click the **Connections** tab.
2. Click **LAN Settings**.
  - If the *Use a proxy server* box isn't checked, exit by clicking **OK**. You aren't using a proxy server, so ignore this setting.
  - If the *Use a proxy server* box is checked, make sure the **Bypass proxy server for local addresses** box is also checked. Then, click the **Advanced** button. In the Exceptions window, enter **localhost** as an entry.

You are now ready to proceed to *Using Adaptec Storage Manager – Browser Edition*.

Configuring Internet Explorer for Remote Management

If you know the IP address of the system you want to manage remotely:

1. Choose **Tools > Internet Options > Connections > LAN Settings**.
2. Select **Use a proxy server for your LAN > Advanced**.
3. In the Exceptions section, type the managed system's IP address.



## Configuring Netscape Navigator for Local Management



### **MSI Reminds You...**

*These instructions apply specifically to version 7 and may differ in later versions.*

To configure Netscape Navigator:

1. Log in to your computer with administrator access.
2. Select **Edit > Preferences**.
3. In the Preferences window, click the right arrow on the Privacy and Security line. Ensure that one of the **Enable cookies** options is selected.
4. Select the **Advanced** line. Ensure that **Enable Javascript for Navigator** is checked.
5. Exit Navigator, then restart it. This enables any settings you have modified.
6. You are now ready to proceed to *Using Adaptec Storage Manager – Browser Edition*.

## Configuring Netscape Navigator for Remote Management

If you know the IP address of the system you want to manage remotely:

1. Choose **Edit> Preferences > Advanced> Proxies > Manual proxy configuration > No Proxy For**.
2. Type the managed system's IP address.

## 5. Installing Adaptec Storage Manager on Linux



### **MSI Reminds You...**

*When performing this installation, keep in mind that Linux is case sensitive.*

To install Adaptec Storage Manager on a Linux computer and configure the desired Internet browser:

1. Insert the product installation CD.
2. Install the software by typing:  
***sh <mount-point>/install.sh.***

The **<mount-point>** differs among computers, but **/mnt/cdrom**, **/media/cdrom**, or **cdrom** usually works. A Welcome window appears.

3. Click **Next**. The License Agreement window appears.
4. Read the license agreement. If you agree to its terms, click **Accept**. If not, click **Cancel** and terminate the installation. The Choose Setup Type window appears. It provides three types of installations: *Typical*, *Compact*, and *Custom*. See *Typical, Custom, and Compact Installations* for details.
5. Choose a setup type and click **Next**. The **Start Copying** window appears.
6. Click **Next**. The Running Non-Interactive Setup window displays the files being loaded onto the system.
7. Click **Next** when prompted. A Setup Complete window appears.
8. Click **Complete**. A message window appears reminding you that any proxy servers must be bypassed for the RAID management application to work. Installing Adaptec Storage Manager – Browser Edition
9. Click **OK**. The Shell window you used to launch the installation indicates that some daemons are being started. The installation creates a shortcut to Adaptec Storage Manager in the System tab. This shortcut launches Adaptec Storage Manager using Mozilla. Unless the controller driver was installed as part of this installation, you do not need to restart your computer.
10. Remove the product installation CD. Your computer must have a Web browser supporting JavaScript and cookies. To use Adaptec Storage Manager, you need to log on to your computer with root privileges.

## **Using Adaptec Storage Manager – Browser Edition**

### **1. Overview**

This section describes how to use Adaptec Storage Manager – Browser Edition to manage arrays. Once you are logged in, you will find convenient online help to guide you through the details of creating, configuring, and managing arrays.



#### **MSI Reminds You...**

*Your controller may not support all of the features described. In most cases if a feature is not supported by your controller the feature does not appear in the interface.*

With Adaptec Storage Manager, you can:

- ◆ Locally manage a system containing a supported Adaptec RAID controller that has Windows or Linux and a supported browser.
- ◆ Remotely manage any system containing a supported Adaptec RAID controller that has Managed System Components (see *Typical, Custom, and Compact Installations*). You can manage a system remotely from a system that does not contain a RAID controller.

These same Windows and Linux systems can also be managed remotely by either of these methods:

- ◆ Installing Adaptec Storage Manager on the remote system.
- ◆ Directing the browser on the remote system to the system you want to manage.



#### **MSI Reminds You...**

*To manage an array remotely from a Linux system, install Adaptec Storage Manager on the system and use the Adaptec-supplied version of Mozilla as the browser.*

## 2. Architecture Overview

A locally managed system requires all of these components:

- ◆ A supported Web browser, which should already be installed on the system.
- ◆ The Adaptec Web service which supplies content displayed on the Web browser.
- ◆ An Adaptec-supplied storage agent.

A remotely managed system requires all of these components:

- ◆ The remote system must contain a browser.
- ◆ The storage agent must always be installed on the system with the RAID controller installed.
- ◆ Remote and managed systems must have a TCP/IP connection.

The Web service can be installed on the same remote system as the browser, the system with the RAID controller installed, or a third system.

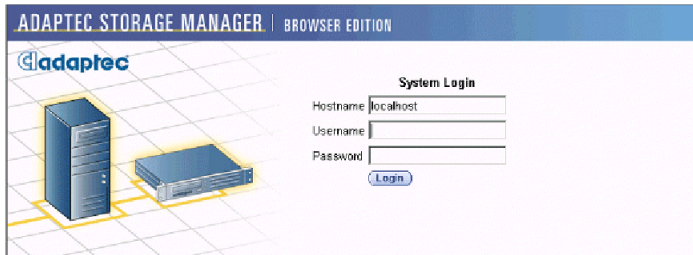
Communication security is ensured because Secure-HTTP (S-HTTP) or SSL protocols are used to encrypt all transmitted data. Connection over an Ethernet network, a corporate WAN, or VPN are supported.

## 3. Logging In

To login:

1. Start Adaptec Storage Manager – Browser Edition.

- ◆ In Windows, click **Start > Programs > Adaptec Storage Manager > Adaptec Storage Manager – Browser Edition**.
- ◆ In Linux, click **Start > System > Adaptec Storage Manager**. The Login screen appears.



2. Enter the host name or IP address of the system you want to manage and the username and password you would use to log into that system.

3. Click **Login**.

**Notes:** When running Adaptec Storage Manager for the first time:

- ◆ You need to install a security certificate if you chose not to during the installation process. For instructions see *Installing a Security Certificate*.
- ◆ You are asked to register your software. For instructions see *Registering Your Software*.

To log in from any system with a Web browser:

1. Start the Web browser application and type the IP address for the system you want to access in the address bar and press **Enter**. For example, <https://10.6.3.14:3513/adaptec>. When connection to the remote system is established, the System Login screen appears.



**MSI Reminds You...**

*If you are using a proxy server to access the Internet, you must bypass the proxy server to access the Adaptec Storage Manager Web server. See *Configuring Internet Browsers on Windows* for details.*

2. Enter the host name or IP address of the system you want to manage and the administrative username and password that you would normally use to log into that system.
3. Click **Login**.

#### **4. Installing a Security Certificate**

If you chose not to install a security certificate when you installed Adaptec Storage Manager – Browser Edition, you must install the certificate when you run the application for the first time.

To create the certificate:

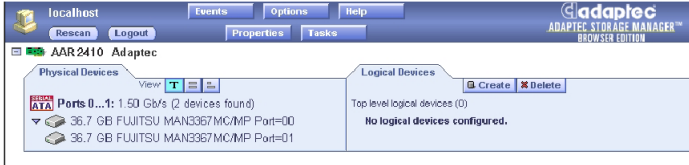
1. When the Security Alert window appears, click **View Certificate**.
2. On the Certificate window, click **Install Certificate**.
3. On the Certificate Import wizard window, click **Next**. The Certificate Import wizard window's contents change.
4. Accept the default, **Automatically select the certificate store**, and click **Next**.
5. On the root Certificate Store window, click **Yes**. Another small Certificate Import wizard window appears.
6. Click **OK**. The Certificate window mentioned in Step 2 reappears.
7. Click **OK**. You are returned to the Security Alert window from Step 1.
8. Click **Yes** to finish the creation and storage of the certificate.

#### **5. Registering Your Software**

After installing and creating a security certificate, you are asked to register the product. If you want click **Register Now**, your computer must have an Internet connection. If you need to delay registration, click **Register Later**. If you choose Register Later, you will be prompted to register the application the next time you run it.

## 6. The Basics

An example of a typical Adaptec Storage Manager – Browser Edition screen is shown below.



### MSI Reminds You...

*Depending on your operating system, browser, and color scheme you may notice some differences between this illustration and your screen.*

The action buttons are:

- **Logout** — Selecting Logout ends your session and returns you to the Login screen.
- **Rescan** — Used to rescan the configuration of the system. Typically, when a rescan is required, it occurs automatically, for example, after an array is created. However, the system configuration can change without Adaptec Storage Manager being notified. For example, drives that are inserted or removed from a nonintelligent enclosure or an enclosure powered on after you logged into Adaptec Storage Manager would not be displayed unless you manually rescan.

The remaining buttons open additional windows that provide more detailed information and allow you to perform actions or change settings on a specific aspect of your storage subsystem.

These are:

- Events
- Options
- Help
- Properties
- Tasks

Immediately following the header frame is a controller information line including the model number of the first Adaptec RAID controller found in the system and the amount of cache memory (if any) installed on that controller.

Beneath the controller information are Physical Devices and Logical Devices views that show connected devices and existing arrays on this controller. Controller information and device views are repeated for each additional Adaptec RAID controller in the system.

Select the controller by clicking anywhere on the controller information. When the controller is selected, the Events, Properties and Tasks buttons change from blue

to amber, indicating that clicking any of them will display an additional window with information and options specific to this controller.

#### ◆ **Pop-Up Tool Tips**

If you position the cursor over a device or button a pop-up tool tip appears. For buttons, the tips contain helpful information about the function of the button, while for devices they display additional information.

#### ◆ **Physical Devices**

The Physical Devices view displays information about the drives and enclosures attached to the Adaptec RAID controller. The devices are shown organized by the channel or port that they are connected to and shown in numerical order.

The display for each channel includes information on maximum speed capability, the number of the channel on the controller, and the number of devices found (excluding the SCSI controller).

Selecting a channel or device will turn the Events, Properties, and Tasks buttons amber. This indicates that clicking any of these buttons will display an additional window with information and options specific to that device or channel.

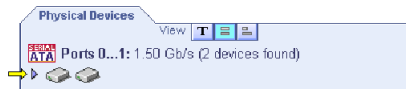
At the top of the Physical Devices view, grouped to the right of View, are three view selection buttons. These buttons select the physical devices connected to this controller.



##### Changing How Drives are Displayed

By default, the Physical Devices displays a condensed view of the controller configuration that hides detailed information about the drives. More information is available by either positioning the mouse pointer over the device or clicking on the arrowhead to the left of a row of devices.


The selected display mode button will appear in a lighter shade of blue than the other two buttons. The default display is the Text Description View, but in the condensed view used when Adaptec Storage Manager is loaded, the display is the same in all three modes.

If you change the display mode by selecting one of the other view buttons, a yellow arrow flashes to the left of any devices where the condensed display prevents omits information.






An icon is always the first entry on each device line. The  icon is used to represent a hard disk drive. If a + symbol appears with the hard disk drive icon , the drive is a hot spare. Different icons are used to represent other devices.


## View

 is the default display mode and when expanded, will show the following information about each device:

- Capacity of the drive
- Drive manufacturer and model number
- SCSI drive ID, or Serial ATA port number

When expanded, the Full Size Capacity View button  and the Relative Size Capacity View button  represent each drive as a bar. A drive that is not used as part of any array is shaded blue surrounded by a dotted line.

 displays a full-length bar for each drive, regardless of capacity.

 displays a bar for each drive, with the largest capacity drive full-length and the other drives proportional to the drive capacity, relative to the largest drive.

Any part of a drive used in an array is shown as a gray segment within the bar. Selecting any gray segment will highlight it in amber and, in the Logical Devices view, highlight the array of which this segment is a member.

In either the Full Size Capacity View or the Relative Size Capacity View, a small portion at each end of the drive may be shown in dark gray.

The segment at the end of the drive may vary in size from drive to drive because, in addition to the RAID signature, the controller may also limit the usable capacity of each drive.

This is done because hard disk drives of apparently the same capacity from different manufacturers, or even different models from the same manufacturer, actually vary slightly in the true capacity available. Although, in normal operation this is not an issue, it can be when assigning hot spares or replacing a failed drive.

If the controller used the maximum capacity of each drive and a hot spare or replacement drive was just a few megabytes smaller, it would not be able to replace the failed drive. By rounding drive capacities down to the nearest 2 MB, this possibility is effectively eliminated.

## ◆ Logical Devices

As described earlier, when Adaptec Storage Manager loads, the Logical Devices view is expanded and you can see the arrays present on the controller.

At the top of this view are the following buttons: Create, Modify, and Delete. Each button opens a wizard for the corresponding function.

Modify allows you to:

- Change an array from one RAID level to another
- Expand an array
- Change the stripe size for a RAID 0



For detailed instructions on using these buttons, refer to the online Help.

The main area of the Logical Devices view is used to display the arrays on this controller. It defaults to a condensed view of top-level arrays.



**MSI Reminds You...**

*The Options button allows you to display second-level arrays if your controller supports them.*

In this condensed view, the RAID level of each device as well as whether it is protected by a hot spare, is visible.

If a global hot spare exists, all arrays that the hot spare is large enough to protect will show as protected.

In the expanded view, the icons for the arrays are arranged vertically and alongside them are the capacity, name, and type of array.

Selecting an array by clicking on it will highlight the following in amber:

- All the drives or segments that form the array in the Physical Devices view.
- The Events, Properties, and Tasks buttons in the header frame. Selecting any of these three buttons displays a new window with additional information and options specific to that array.



**MSI Reminds You...**

*For Windows Server 2003 only—to see animated icons on Adaptec Storage Manager - logical devices, go to **Internet Explorer Properties/Advanced/Multimedia**, and check **Play animations in Web Pages** option.*

## Adaptec RAID Configuration Utility

The Adaptec RAID Configuration (ARC) utility is an embedded BIOS utility that includes:

- **Array Configuration Utility (ACU)**—Used to create, configure, and manage arrays.
- **Disk Utilities**—Used to format or verify disks.

To run ARC, press **Ctrl+A** when prompted by the following message during the system startup:

Press <Ctrl><A> for Adaptec RAID Configuration Utility

The ARC menu appears, presenting these options:

- Array Configuration Utility (ACU)
- Disk utilities

To select an option from this menu, or from any of the menus within ARC, browse with the arrow keys and then press **Enter**. In some cases, selecting an option displays another menu. To return to the previous menu at any time, press **Esc**.

### 1. Using the Array Configuration Utility

The Array Configuration Utility (ACU) enables you to create, manage, and delete arrays from the controller's BIOS, and initialize drives.

#### ◆ Managing Arrays

Use the **Manage Arrays** option to view array properties and members, and delete arrays. The following sections describe these operations in greater detail.

Viewing Array Properties

To view the properties of an existing array:

1. At the BIOS prompt, press **Ctrl+A**.
2. From the ARC menu, select **Array Configuration Utility (ACU)**.
3. From the ACU menu, select **Manage Arrays**.
4. From the List of Arrays dialog box, select the array you want to view and press **Enter**. The Array Properties dialog box appears, showing detailed information on the array. The physical disks associated with the array are displayed here.
5. Press **Esc** to return to the previous menu.

Deleting Arrays



#### **MSI Reminds You...**

*Back up the data on an array before you delete it. Otherwise, all data on the array is lost. Deleted arrays cannot be restored.*

To delete an existing array:

1. Turn on your computer and press **Ctrl+A** when prompted to access the ARC utility.
2. From the ARC menu, select **Array Configuration Utility (ACU)**.

3. From the ACU menu, select **Manage Arrays**.
4. Select the array you wish to delete and press **Delete**.
5. In the Array Properties dialog box, select **Delete** and press **Enter**. The following prompt is displayed:  
Warning!! Deleting the array will render array unusable. Do you want to delete the array?(Yes/No):  
*RAID 1 only*—the following prompt is also displayed:  
Deleting the partition will result in data loss! Do you also want to delete the partition? (Yes/No):
6. Press **Yes** to delete the array or partition or **No** to return to the previous menu.
7. Press **Esc** to return to the previous menu.

### ◆ Creating Arrays

Before creating arrays, make sure the disks for the array are connected and installed in your system. Note that disks with no usable space, or disks that are uninitialized are shown in gray and cannot be used. See *Initializing Disk Drives*.

To create an array:

1. Turn on your computer and press **Ctrl+A** when prompted to access the ARC utility.
2. From the ARC menu, select **Array Configuration Utility (ACU)**.
3. From the ACU menu, select **Create Array**.
4. Select the disks for the new array and press **Insert**. To deselect any disk, highlight the disk and press **Delete**.
5. Press **Enter** when both disks for the new array are selected. The Array Properties menu displays.

Assigning Array Properties



#### **MSI Reminds You...**

*Once the array is created and its properties are assigned, you cannot change the array properties using the ACU. Instead, use Adaptec Storage Manager - Browser Edition.*

To assign properties to the new array:

1. In the Array Properties menu, select an array type and press **Enter**. Note that only the available array types, RAID 0 and RAID 1, are displayed. Each of these types requires two drives.
2. Type in an optional label for the array and press **Enter**.
3. For RAID 0, select the desired stripe size. Available stripe sizes are 16, 32, and 64 KB (default).



#### **MSI Reminds You...**

*Adaptec recommends that you do not change the default.*

4. Create RAID via allows you to select between the different creation methods for RAID 0 and RAID 1. The following table gives examples of when each is appropriate.

RAID level	Create via	When appropriate
RAID 0	No Init	Creating a RAID 0 on new drives.
RAID 0	Migrate <sup>1</sup>	Creating a RAID 0 from one new drive and one drive with data you wish to preserve.
RAID 1	Build <sup>1</sup>	Any time you wish to create a RAID 1, but especially if you have data on one drive that you wish to preserve.
RAID 1	Clear	Creating a RAID 1 on new drives, or when you want to ensure that the array contains no data after creation.
RAID 1	Quick Init	Fastest way to create a RAID 1. Appropriate when using new drives.

<sup>1</sup> If you select Migrate for RAID 0, or Build for RAID 1, you will be asked to select the source drive. The contents of the source drive will be preserved. However, the data on the new drive will be lost.

Notes:

- Before adding a new drive to an array, back up any data contained on the new drive. Otherwise, all data will be lost.
- If you stop the Build or Clear process on a RAID 1 from ACU you can only restart it from Adaptec Storage Manager - Browser Edition. (See Chapter 4 for details.)
- A RAID 1 created using the Quick Init option may return some data miscompares if you later run a consistency check. This is normal and is not a cause for concern.
- The ACU allows you to use drives of different sizes in a RAID 1. During a build operation however, only the smaller drive can be selected as the source or first drive.
- When migrating from single volume to RAID 0, migrating from a larger drive to a smaller drive is allowed. However the destination drive must be at least half the capacity of the source drive.
- Adaptec does not recommend that you migrate or build an array on Windows dynamic disks (volumes), as it will result in data loss.



**MSI Reminds You...**

*Do not interrupt the creation of a RAID 0 using the Migrate option. If you do, there is no way to restart, and no way to recover the data that was on the source drive.*

5. When you are finished, press **Done**.

### ◆ Initializing Disk Drives

If an installed disk does not appear in the disk selection list for creating a new array or if it appears grayed out, you may have to initialize it before you can use it as part of an array. Drives attached to the controller must be initialized before they can be used in an array.



#### **MSI Reminds You...**

*Initializing a disk overwrites the partition table on the disk and makes any data on the disk inaccessible. If the drive is used in an array, you may not be able to use the array again. Do not initialize a disk that is part of a boot array. To determine which disks are associated with a particular array, see Viewing Array Properties.*

To initialize drives:

1. Turn on your computer and press **Ctrl+A** when prompted to access the ARC utility.
2. From the ARC menu, select **Array Configuration Utility (ACU)**.
3. Select **Initialize Drives**.
4. Use the up and down arrow keys to highlight the disk you wish to initialize and press **Insert**.
5. Repeat Step 4 so that both drives to be initialized are selected.
6. Press **Enter**.
7. Read the warning message and ensure that you have selected the correct disk drives to initialize. Type Y to continue.

## 2. Using the Disk Utilities

The Disk Utilities enable you to format or verify the media of your Serial ATA hard disks.

To access the disk utilities:

1. Turn on your computer and press **Ctrl+A** when prompted to access the ARC utility.
2. From the ARC menu, select **Disk Utilities**.
3. Select the desired disk and press **Enter**.

You are offered the following options:

- **Format Disk**—Simulates a low-level format of the hard drive by writing zeros to the entire disk. Serial ATA drives are low-level formatted at the factory and do not need to be low-level formatted again.



#### **MSI Reminds You...**

*Formatting destroys all data on the drive. Be sure to back up your data before performing this operation.*

- **Verify Disk Media**—Scans the media of a disk drive for defects.

## Glossary

### A

#### **activity**

See *task*.

#### **ACU**

Array Configuration Utility. An application used to create, configure, and manage arrays from the controller's BIOS or MS-DOS.

#### **array**

A logical disk created from available space and made up of one or more segments on one or more physical disks. Arrays are typically used to provide data redundancy or enhanced I/O performance. See also *volume*, *spanned volume*, *RAID 0*, *RAID 1*. Also known as a *container*.

#### **array initialization**

See *initialize*.

#### **ATA**

AT Bus Attachment. Standard parallel interface to IDE hard disks typically used in desktop computers and some entry-level servers. *Serial ATA (SATA)*, is a successor to parallel ATA, which is sometimes referred to as PATA.

#### **available space/segment**

Unused space on an initialized disk from which logical devices (arrays) are created. When an array is deleted, the space that it used is returned to the available space pool.

### B

#### **background consistency check**

Option that forces the controller to constantly check all portions of disks used by all arrays to see if the disks can return data from the blocks. See also *consistency check command*.

#### **bad segment**

Segment that is in an unknown state.

#### **bootable array**

Array configured as the boot device.

#### **build**

Background initialization of a redundant array. The array is accessible throughout. RAID 1 copies the contents of the primary drive to a secondary drive. See also *clear*.

#### **bus**

See *channel*.

## **C**

### **cache**

Fast-access memory on the controller that serves as intermediate storage for data that is read from, or written to, drives.

### **capacity**

Total usable space available in megabytes or gigabytes.

### **channel**

Any path, or *bus*, used for the transfer of data and the control of information between storage devices and a RAID controller. For Serial ATA channels, each channel has a single drive capacity.

### **chunk**

See *stripe*.

### **clear**

Foreground initialization of a fault-tolerant array. A *clear* operation zeros all blocks of the array. The array is not accessible until the clear task is complete.

### **concatenation**

Joining of physical or logical drives in sequential order.

### **consistency check command**

Command that reads all the blocks of a RAID 1 to determine if the blocks are consistent. Any inconsistent blocks are fixed.

## **D**

### **dead partition**

See *failed*.

### **dedicated hot spare**

Component that can take the place of a failed component only on the fault-tolerant array to which it is explicitly assigned.

### **degraded**

A redundant (for example, a RAID 1) array in which one or more members have failed. The data is intact but redundancy has been compromised. Any further failure would cause the array to fail and result in data loss.

### **disk**

Physical disk drive. Randomly accessible, re-writable data storage device. Also called *hard disk*.

### **disk ID**

Unique disk identifier that consists of the channel number, SATA ID. For example, (channel:ID:LUN) 1:04:0. See also *channel*.

**drive LED**

Disk indicator LED that illuminates during read or write operations.

**E**

**event**

Notification or alert from the system, indicating that a change has occurred.

**event log**

File used to maintain information about prior controller activities or errors.

**event notification**

Process for transmitting events.

**F**

**failed**

State of a nonredundant array that has suffered a single drive failure, or a redundant array that has suffered multiple drive failures. A failed array is inaccessible and data is lost.

**fault-tolerant array**

Refers to an array that can continue to function after a disk drive failure without loss of data. Fault tolerant, or redundant arrays, include RAID 1 arrays. See also *Redundant*.

**foreign disk**

Disk that has previously been initialized on another Adaptec RAID controller. The RAID signature on the disk allows the RAID controller to identify whether or not the disk was initialized on the controller it is currently connected to.

**H**

**hard disk drive**

Basic unit of nonvolatile, nonremovable, magnetic storage media. See also *disk*.

**hot swap**

To remove a component from a system and install a new component while the power is on and the system is running.

**I**

**impacted**

An impacted array is one which has been created but for some reason the initial build operation did not complete. All member drives are present and operational, and all data written to the array is protected. To optimize the array, run a Verify with Fix Task.

**initialize**

Process of preparing a disk for use by the controller. When a disk is initialized, the controller records the RAID signature on the disk.



**initialized array**

An array that is ready for data reads and writes. Arrays can be initialized by *build* or *clear*.

**L**

**legacy disk**

Disk that contained a valid partition table when connected to the controller. The controller manages the disk as a legacy disk array where there is a one-to-one logical-to-physical mapping of array to disk.

**logical device**

Volume comprised of space from one or more physical drives and presented to the operating system as if it were a single storage unit.

**low-level format**

Process performed by the drive firmware that completely cleans any data off the hard disk.

**M**

**mirrored array/mirroring**

See *RAID 1*.

**monitoring**

Process of receiving, displaying, and logging system events.

**O**

**offline array**

Array that can no longer be accessed.

**optimal**

The state of an array when it is fully operational. For redundant arrays, the entire array is protected.

**P**

**partition**

A section of a disk storage device created by the operating system disk management program, in which data and/or software programs are stored. Computers have a primary operating system partition that contains the special files needed to boot the computer. Each operating system partition is assigned a unique drive letter, such as C or D. A single disk device can have multiple partitions.

**phantom object**

Object that represents a component that cannot be configured by the controller management software; for example, a missing drive.

## Q

### **quick init**

An array initialized using the Quick Init option is available immediately, with no on-going background controller activity. All data written to an array that has been quick initialized is protected.

## R

### **RAID**

Redundant Array of Independent Disks (alternative definition Redundant Array of Inexpensive Disks).

### **RAID 0**

A *single-level array* consisting of two or more equal-sized segments residing on different disks. RAID 0 distributes data evenly across its respective drives in equal-sized sections called *stripes*. RAID 0 arrays are not redundant.

### **RAID 1**

Single-level array consisting of two equal segments residing on two different drives. Provides redundancy by storing identical copies on two drives. See also *mirrored array/mirroring*.

### **RAID signature**

The area on each disk reserved for use by the RAID controller.

### **RAID volume**

Concatenates two or more arrays of the same type.

### **rebuild**

Background regeneration of redundant data on a RAID 1.

### **redundant**

The ability of an array to maintain operability when one or more hardware failures occur. RAID 1 is redundant. In the event of a drive failure, redundant arrays can be restored to normal operation by replacing the failed drive and rebuilding the array.

### **rescan**

Process of updating the current screen to show all currently available resources.

## S

### **Serial ATA (SATA)**

A successor to ATA that uses a serial, instead of parallel, interface.

### **simple volume**

A volume made up of disk space from a single disk. It can consist of a single region on a disk or concatenated, multiple regions of the same disk.

**single-level array**

Array created from one or more segments. See also *volume*, *spanned volume*, *RAID 0*, *RAID 1*.

**snapshot**

Instantaneous read-only copy of an array at a precise point in time.

**spanned volume**

A simple volume that spans two or more drives.

**stripe**

Contiguous set of data distributed across all the disks in an array. A striped array distributes data evenly across all members in equalized sections called *stripes*.

**stripe size**

The amount of data in each section of a striped array.

**striped array**

See *RAID 0*.

**T****task**

An operation that occurs only on the RAID controller, asynchronous to all other operations; for example, initializing a disk or verifying an array. Some tasks can take an extended period of time, particularly if the RAID controller is also performing intensive data I/O while the task is running.

**V****verify**

Low-level check that a drive, logical device, or hot spare is good. In a RAID 1, verify is a low-level check that contents of both members' segments are consistent and, optionally, corrects errors while assuming that the master drive is correct. In a simple volume, verify performs a low-level check that the whole drive can be read.

**volume**

See *simple volume*, *spanned volume*.